THE

BRITISH COLUMBIA PILOT,

INCLUDING

THE COAST OF BRITISH COLUMBIA, FROM JUAN DE FUCA STRAIT TO PORTLAND CANAL,

TOGETHER WITH

VANCOUVER AND QUEEN CHARLOTTE ISLANDS.

COMPILED FROM ADMIRALTY SURVEYS.

PUBLISHED BY ORDER OF THE LORDS COMMISSIONERS OF THE ADMIRALTY.

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1888.

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For Later Information the Hydrographic Notice No. 1 should also be purchased.

ADVERTISEMENT

TO THE

BRITISH COLUMBIA PILOT.

THE British Columbia Pilot contains sailing directions for the coast from Juan de Fuca strait to Portland canal; with the adjacent inner channels; also Vancouver and Queen Charlotte islands.

The information relating to the coast from the entrance to Juan de Fuca strait, and Haro and Rosario straits, to Bute inlet, as also to Vancouver island and adjacent channels, was obtained from the journals and surveys conducted by Captain G. H. Richards, R.N., in H.M. Surveying Vessels *Plumper* and *Hecate*, between the years 1857 and 1862. This, together with a description of the included shores of Washington territory, derived from United States Government Surveys, was published as the Vancouver Island Pilot, in 1864.

The coast of the mainland from Bute inlet to Queen Charlotte sound is chiefly derived from the Admiralty survey in charge of D. Pender, Master R.N., 1863–65.

The directions for the coast between Queen Charlotte sound and Portland canal, with the adjacent inner channels, are chiefly derived from the Admiralty survey conducted by Staff Commander D. Pender, R.N., during the years 1865–70. The description of Queen Charlotte islands is compiled chiefly from the report by G. M. Dawson, Esq., F.G.S., published by the Government of Canada, 1880, to which is added information derived from a visit of H.M.S. *Virago* in 1853, and from the Admiralty Survey of 1866. These were originally published as the Vancouver Island Pilot Supplement, in 1883.

17498. Wt. 97.

In the present edition, the most recent information derived from the Remark books of Officers of Her Majesty's ships, the Government of Canada, and from other sources, including Vancouver's Voyage; the Pacific Coast Pilot of California, Oregon and Washington Territory, 1869; and the Pacific Coast Pilot, Alaska, Part I., 1883, published by the United States Government, has also been embodied. It has been prepared by Staff Commander F. W. Jarrad and Captain W. H. Sharp, R.N.

Notices of errors or omissions in this work, as well as any new information of interest to the navigator, should be transmitted to the Secretary of the Admiralty.

By the publication of this work, the Vancouver Island Pilot, 1864; the Supplement to Vancouver Island Pilot, 1883; also all Hydrographic Notices relating to them; and all Notices to Mariners, inclusive of No. 89 (1), of 1888, are cancelled.

W. J. L. W

Hydrographic Office, Admiralty, London,
March 1888.

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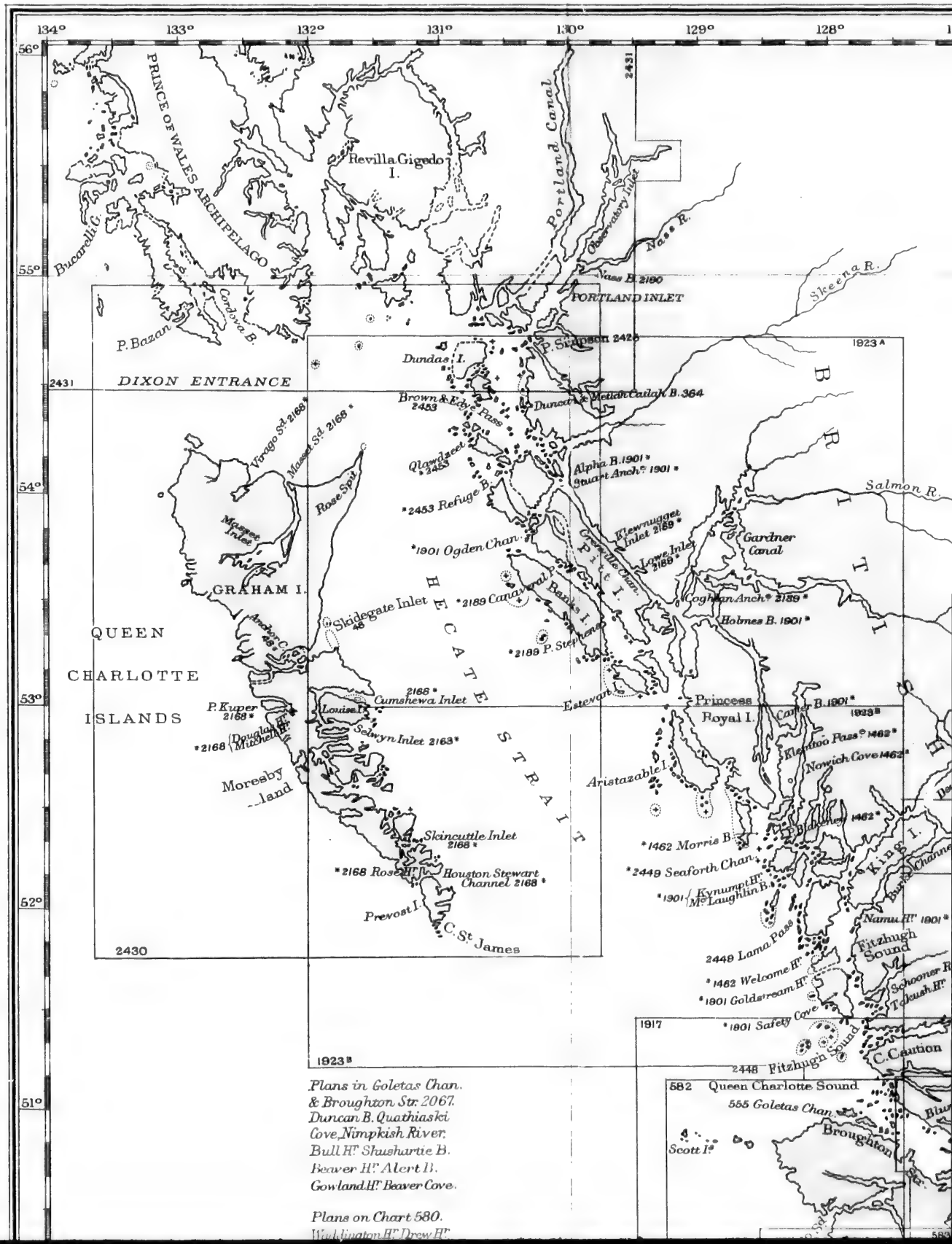
IN THIS WORK THE BEARINGS ARE ALL MAGNETIC, EXCEPT WHERE MARKED AS TRUE.

THE DISTANCES ARE EXPRESSED IN SEA MILES OF 60 TO A DEGREE OF LATITUDE.

A CABLE'S LENGTH IS ASSUMED TO BE EQUAL TO 100 FATHOMS.

THE SOUNDINGS ARE REDUCED TO LOW WATER OF ORDINARY SPRING TIDES.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PRINCE OF WALES ARCHIPELAGO
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1917
1901 Safety Cove
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Plans in Goletas Chan.
& Broughton Str. 2067.
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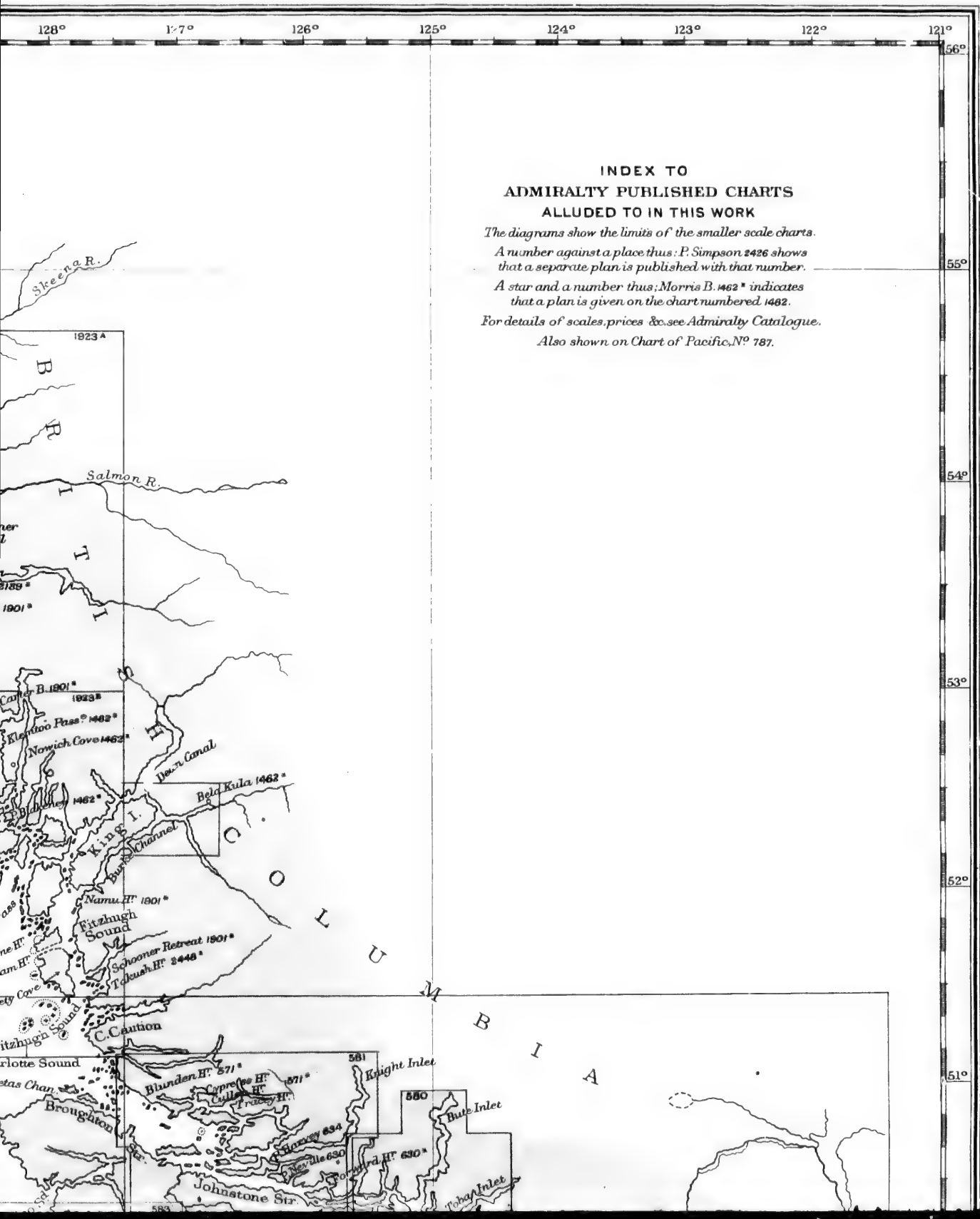
Cove, Nimpkish River.
Bull H. Shushartie B.
Beaver H. Alert B.
Gowland H. Beaver Cove.
Plans on Chart 580.
Wadlington H. Drew H.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124°
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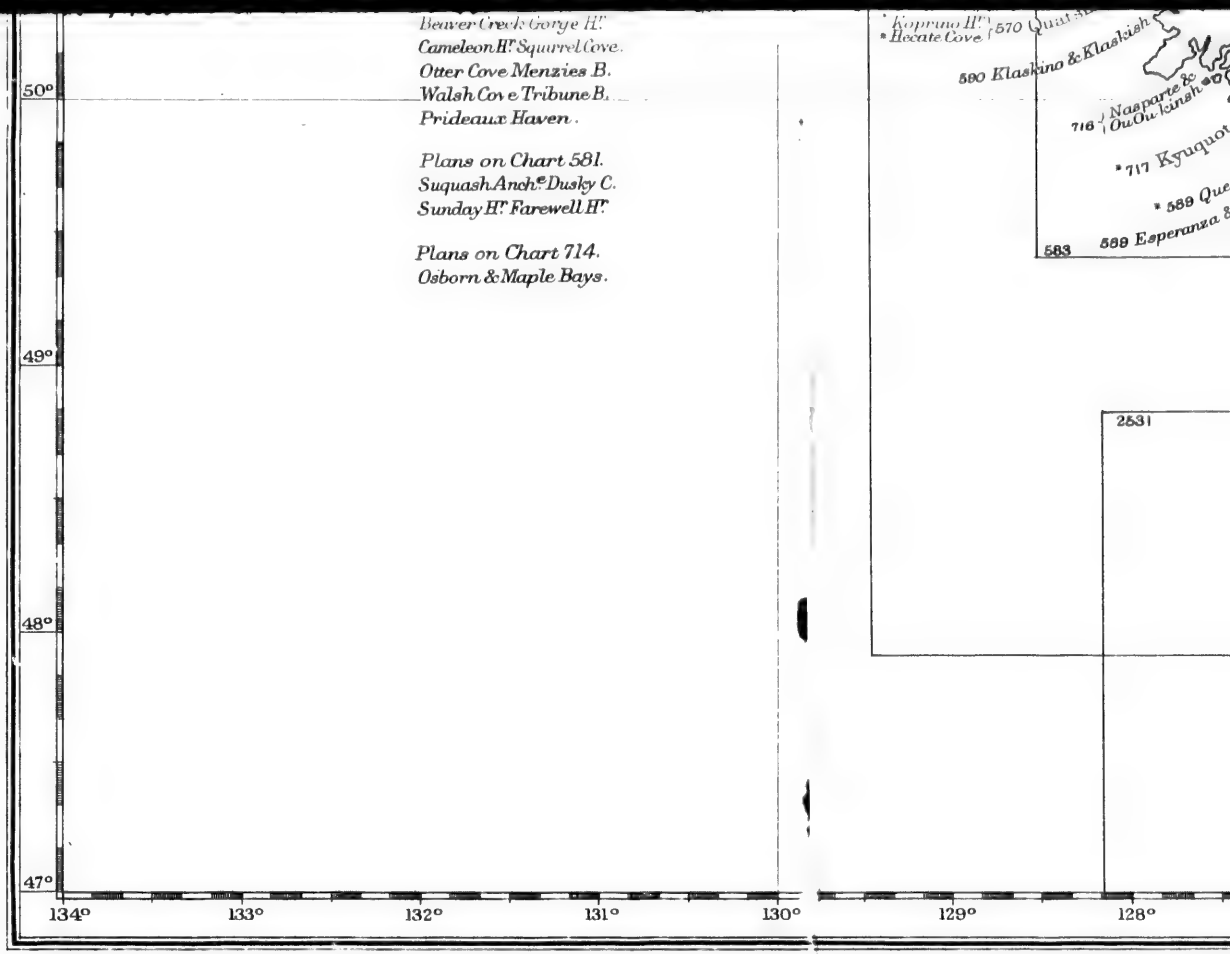
ADMIRALTY PUBLISHED CHARTS
ALLUDED TO IN THIS WORK
The diagrams show the limits of the smaller scale charts.
A number against a place thus: P. Simpson 2426 shows that a separate plan is published with that number.
A star and a number thus; Morris B. 1462* indicates that a plan is given on the chart numbered 1462.
For details of scales, prices &c. see Admiralty Catalogue.
Also shown on Chart of Pacific, No 787.
Skeena R.
1923*
Salmon R.
Carter B. 1901*
1923*
Klemtoo Pass* 1462*
Nowich Cove 1462*
Dean Canal
Bella Kula 1462*
Burke Channel
Namu Hr 1901*
Fitzhugh Sound
Schooner Retreat 1901*
Talcush Hr 2448*
C. Caution
Fitzhugh Sound
Knight Inlet
581
Blunden Hr 571*
Cypress Hr 571*
Cullen Hr
Tracey Hr
580
Bute Inlet
Broughton Str.
Harvey 634
Neville 630
Forward Hr 630*
Johnstone Str.
Toba Inlet
583
B R I T I S H
C O L U M B I A


Beaver Creek Gorge H.r
Cameleon H.r Squirrel Cove.
Otter Cove Menzies B.
Walsh Cove Tribune B.
Prideaux Haven.
Plans on Chart 581.
Suquash Anch.e Dusky C.
Sunday H.r Farewell H.r
Plans on Chart 714.
Osborn & Maple Bays.
Kyprino H.r
Hecate Cove
570
590 Klaskino & Klaskish
716 Nasparte & Ou-Ou-kinsh
717 Kyuquot
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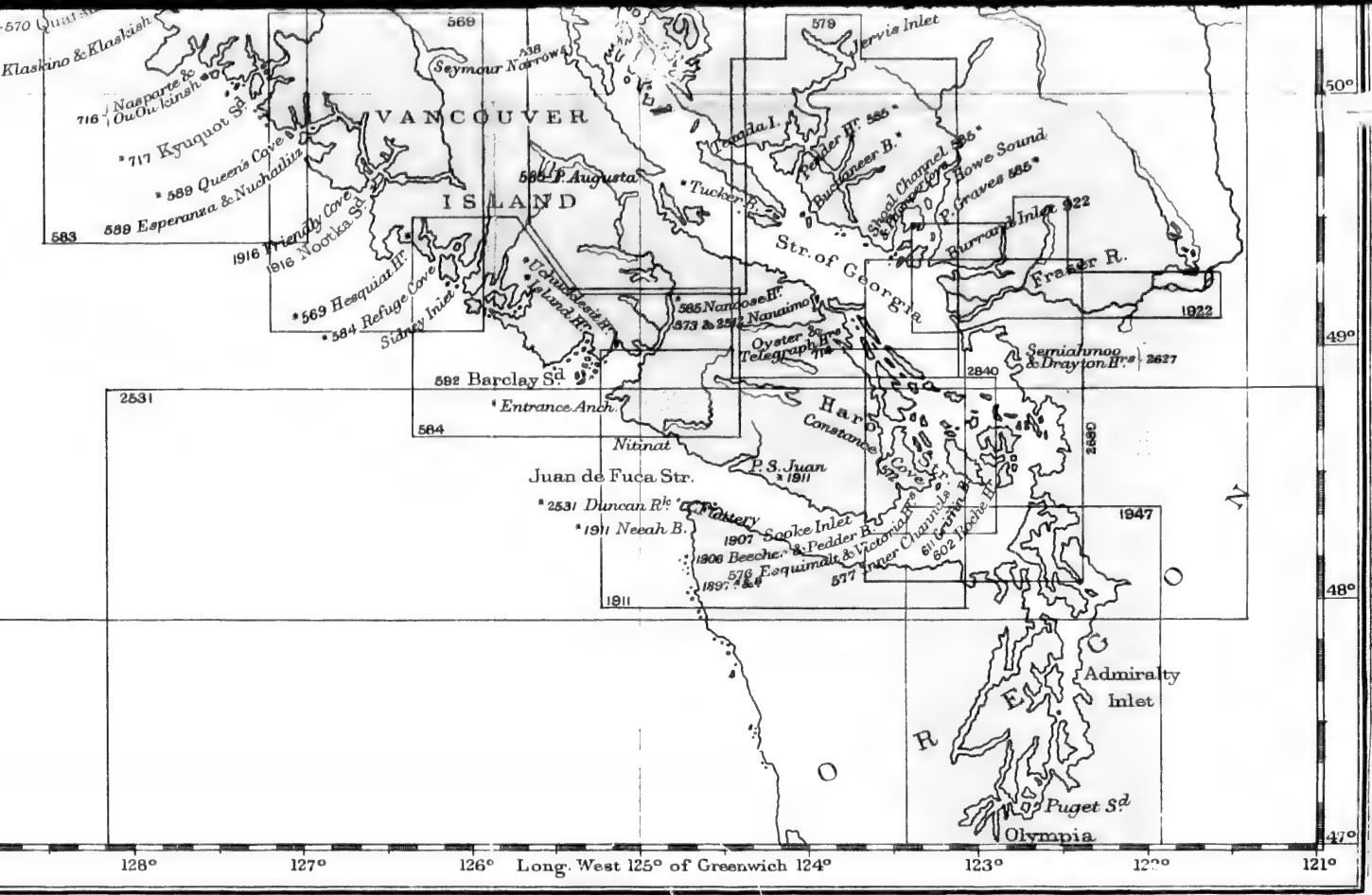
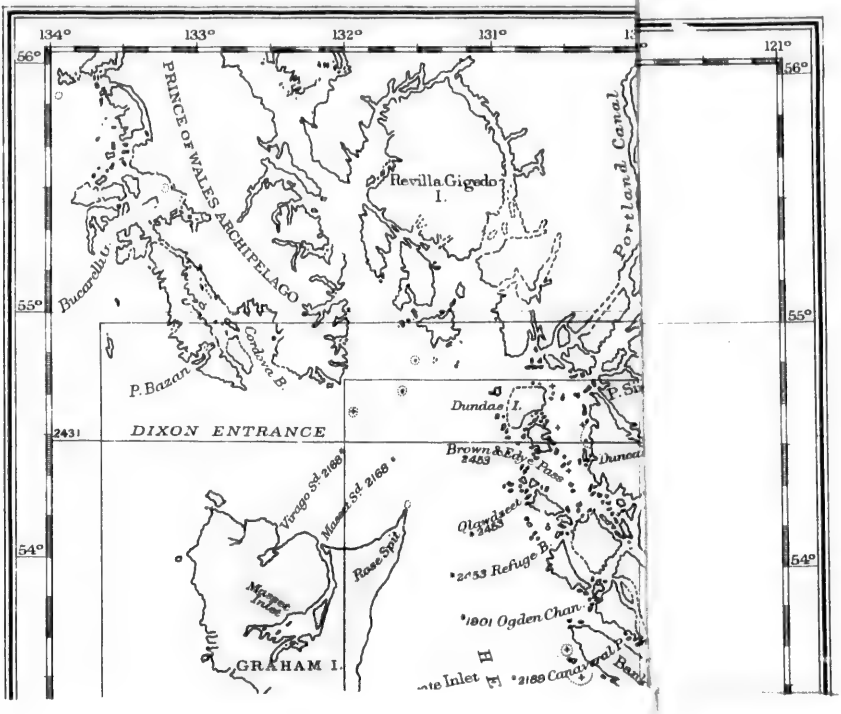


March 1888

Engraved by Davies & Company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PRINCE OF WALES ARCHIPELAGO
Revilla Gigedo I.
Portland Canal
Bucarelli B.
Cordova B.
P. Bazan
DIXON ENTRANCE
2431
Dundas I.
Brown & Eddy Pass
Virago Sd 2168
Massett Sd 2168
Rose Spit
Masset Inlet
GRAHAM I.
Clarence Str
2453 Refuge B.
1901 Ogden Chan.
2189 Cumshewal
Basil

THE

BRITISH COLUMBIA PILOT.

INTRODUCTORY CHAPTER.

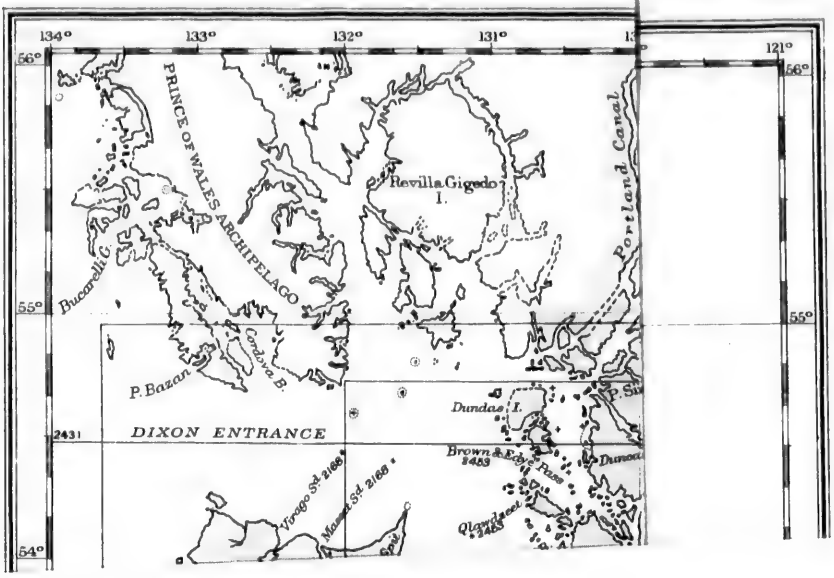
GENERAL REMARKS.—WINDS, CURRENTS, CLIMATE, METEOROLOGY.—PRODUCTS.—PASSAGES.

For later information respecting the lights which are described in this work, seamen should consult the Admiralty List of Lights in South America, Western Coast of North America, Pacific Islands, &c. This list is published early in the current year, corrected to the previous 31st December.

the island under a Royal Charter granted in the reign of Charles II.

Products.—British Columbia contains extensive tracts of arable land, and a large auriferous district. Gold was first discovered on Thompson river in 1858. Coal is found on the mainland and on Vancouver island; the mines at Nanaimo and Departure bay, which yield bituminous coal, being the principal places on the island. Anthracite coal is also found, especially in Queen Charlotte islands. During 1870 about 30,000 tons were exported; in 1884 the value of coal exported amounted to $2,000,000, and in 1886 to $973,000.

Wheat, barley, oats, potatoes, peas, vegetables, and fruits flourish in British Columbia. The fisheries are very rich, but are not yet developed; whaling is, however, being carried on to a small extent, and the dog-fish catch is steadily progressing. Salmon is abundant, the export of which, chiefly in tins, constitutes one of the principal sources of wealth in the country; it is also an important part of the food of the Indians.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PRINCE OF WALES ARCHIPELAGO
Revilla Gigedo I.
Portland Canal
Bucarelli G.
Cordova B.
P. Bazan
DIXON ENTRANCE
2431
Dundas I.
Brown & Egg Passs
1485
Virago Sd. 2166
Maxwell Sd. 2166
Observatory
Dundas

THE

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INTRODUCTORY CHAPTER.

GENERAL REMARKS.—WINDS, CURRENTS, CLIMATE, METEOROLOGY.—PRODUCTS.—PASSAGES.

BRITISH COLUMBIA, a province of the Dominion of Canada, entered the Confederation in 1871. It includes Vancouver island (first constituted a British colony in 1849), also the numerous islands and adjacent mainland of North America lying between point Roberts in the strait of Georgia, and Portland canal. The average breadth of British Columbia is about 250 miles, and the length of its coast line about 450 miles; the area including Vancouver island and Queen Charlotte islands is roughly estimated at 466,000 square miles.

Vancouver island became a Crown colony in 1858, and was united to British Columbia (the mainland colony) as one colony under the name of British Columbia in 1866. Previous to 1858 the island had been for the most part in the hands of the Hudson's Bay Company, who held their lands in the island under a Royal Charter granted in the reign of Charles II.

Products.—British Columbia contains extensive tracts of arable land, and a large auriferous district. Gold was first discovered on Thompson river in 1858. Coal is found on the mainland and on Vancouver island; the mines at Nanaimo and Departure bay, which yield bituminous coal, being the principal places on the island. Anthracite coal is also found, especially in Queen Charlotte islands. During 1870 about 30,000 tons were exported; in 1884 the value of coal exported amounted to $2,000,000, and in 1886 to $973,000.

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Houlican, somewhat resembling the sardine, cod, herring, halibut (of enormous size), sardines, anchovy, haddock, and oysters are also found. The value of fish exported during the year 1886 aggregated $633,110, the principal being tinned salmon, which amounted in 1884 to 6,193,968 lbs. to Great Britain alone.

The fur trade, which, until the year 1860 was entirely monopolized by the Hudson's Bay Company, is considerable; the value of the furs exported in the year 1869 being upwards of $240,000; in 1886 it was $329,248. Among the numerous fur bearing animals the principal are the sea otter, marten, silver fox, black fox, and red fox.

The forests are of great extent, producing valuable timber, of which the Douglas pine (commonly called Oregon pine), white pine, maple, Scotch fir, and cedar are the principal; the former, yielding spars 100 to 150 feet in length, and from 20 inches to 2 feet in diameter, is that principally exported in large cargoes. Besides the above, the yellow cypress, poplar, arbor-vitæ, yew, oak, arbutus, alder, dog-wood, cherry, crab-apple, willow, and cotton-wood are found. The value of the export of timber in 1871 amounted to about $250,000, and in 1886 to $200,178. Cattle, horses, sheep, and farm animals thrive generally in all parts.

The manufactures of British Columbia consist of saw mills and flour mills, breweries, and distilleries; they are rapidly increasing.*

Trade.—During the year 1870 the value of the exports amounted to about $210,000, exclusive of gold, which amounted to $1,002,717; this latter does not include the gold carried out of the country by miners, estimated at one-third of the above amount. In 1886 the amount of gold dust and bars exported was valued at $746,690.

The customs duty for 1886 collected at Victoria amounted to about $880,000, and the total value of the exports of British Columbia to $2,885,823. The imports amounted to $3,956,308.

Population.—The population of British Columbia is to some extent migratory; in 1871 it amounted to 10,586, exclusive of Indians, and was classed as follows: 8,576 whites, 462 negroes, and 1,548 Chinese: but in 1885 the population of Victoria alone reached to nearly 12,000, and continues to increase with rapidity. The Indian population is estimated at about 30,000 or 40,000; 17,000 being on Vancouver island, but they appear to be gradually diminishing in numbers, consequent on tribal wars, feuds, and the ravages of small-pox and measles, both of which diseases are deadly amongst the natives.

* There is regular communication by steamer between British Columbia and Japan, China, Sandwich islands, New Zealand, Australia, San Francisco, and the ports in Puget sound.

Missionary stations have been established at Alert bay, fort Rupert, Metlah catlah, on the Skeena and Nass rivers, and at Massett in Queen Charlotte islands.

The Indians along the coast have great skill in the building and management of canoes; they are a polygamous race, and subsist chiefly by hunting and fishing; those of southern Columbia are dark, and wear their hair long, while those of the more northern districts are of a clearer tint. The coast Indians live in substantial one-story dwellings of axe-hewn timber, divided into several compartments, of which one is occupied by each family. In the interior the houses or wigwams are made of skins, old tent cloths, and mats; in severe weather they take shelter in underground houses (circular pits) from 20 to 40 feet in diameter, and 8 or 10 feet deep, covered over with a substantial earthed roof, with a 3-feet circular aperture in the centre, forming the only outlet for the inhabitants and smoke.

Railways.—The Canadian Pacific Railway crosses the heart of the British possessions in the North American continent, and is 3,054 statute miles in length between Quebec and Vancouver town in Burrard inlet, the western terminus; the distance being accomplished in about 5 days 22 hours, and trains leave daily from both places. The railway is in course of construction from Vancouver town to English bay, and a branch line has been made from port Moody to New Westminster.

A railway has also been constructed on Vancouver island, between Victoria, Esquimalt, and Nanaimo, and there is now daily communication between these places.

TELEGRAPHS.—Esquimalt is in telegraphic communication with England through Canada, by way of Nanaimo and Burrard inlet. Also through the United States, by way of Seattle.*

Earthquakes.—*See* pp. 40, 221.

CLIMATE.—The climate of British Columbia varies considerably according to the locality; in the southern parts and on Vancouver island it is temperate during summer, the thermometer seldom, if ever, rising on the hottest day above 80° Fah., or falling below 20° Fah. in winter; and it may, in fact, be said that this region possesses the climate of England without its humidity. In the central part of the province, however, the drought, heat, and cold are greater, the heat sometimes being very intense. It is, however, remarkably healthy both in summer and winter, there being no malaria or ague either during the hottest weather or in the dampest localities. Generally speaking, the summers are dry at Vancouver island, but with occasional showers; the winters bring a good deal of rain, and snow falls more or less each year.

In the northern part of the province along the coast the atmosphere is excessively humid, and rain falls heavily.

* Submarine electric cables cross Juan de Fuca strait from Clover point to New Dungeness; and the strait of Georgia from Valdes island to point Grey.

The climate of the mainland coast opposite Vancouver island differs somewhat from that of the S.E. portion of Vancouver island. In summer the temperature averages slightly higher, and in winter somewhat lower, while the rainfall is greater immediately along the coast. The lower Fraser valley (New Westminster district) does not receive in summer the cold breezes from the Olympian mountains which blow across Victoria, nor does it receive in winter so much of the genial warmth of warm ocean air. As a general thing ice forms on the river for a short time and snow begins to fall in January, and continues to do so intermittently till March, the ground not being continuously covered with it. Observations for seven consecutive years—1874 to 1880—at New Westminster give the highest maximum temperature, 92° in July, and the lowest 7° in January, the mean annual rainfall being 59·66 inches.

Taken as a whole, the climate, differing widely as it does in places, is salubrious and invigorating. No miasmatic infection from ague-breeding marshes taints the atmosphere whatever locality may be selected for a residence, whether one of moist air and equable temperature along the coast, or the dryer and more varying one of the interior; the climate will be found healthful, invigorating, and calculated to inspire activity, comparing more than favourably with the same latitude on the Atlantic slope.*

Thermometer.—At Esquimalt the highest summer temperature averages 72° Fah. (in August), June, July, and August being the warmest months of the year. The lowest temperature averages 23½° Fah., the coldest months being December, January, and February. The greatest daily range occurs in March, and the smallest in October.

The temperature on Vancouver island during summer is lower than on the mainland, owing to the prevailing S.E. winds blowing from the snow-capped mountains on the American side and across the sound. The waters of the sound are peculiarly cold at this season.

Barometer.—The barometric variations are neither great nor frequent, the range for the year averaging about 1·5 inches.

Port Simpson.—The climate at port Simpson is uncertain, no two seasons being precisely the same, or appearing to follow any general law.

During one summer fine weather may be experienced for six weeks at a time, and on such occasions a serene atmosphere, with magnificent sunsets, will be experienced. The following summer may prove one of almost constant rain, with a succession of gales from the south-eastward. Along the shores of Chatham sound the rainfall is not so great as within the inlets. The temperature during July and August 1869 varied from 57° to 64°; during June, July, and August 1868 it varied from 48° to 73°.

* *The West Shore*, September 1884, p. 291; and 1887, p. 425.

The mean temperature of the sea was 4° lower than the mean temperature of the atmosphere at port Simpson during these periods, but at Metlah catlah and Nass bay it was 8° lower than the atmosphere, probably due to the influence of the cold water from the rivers which flow into those bays.

Birds.—During the month of May humming birds in great numbers arrive, and remain until the end of August. They are snared by the Indian boys, and brought alongside for sale, suspended to sticks.

At the beginning of October, large flocks of wild geese, and ducks, are seen flying southward; and the winter season is then assumed to have commenced.

Temperature.—From observations taken in 1868, during the four months mentioned, the maximum and minimum registrations of temperature were as follows:—June, 65°, 50°; July 74°, 48°; August, 70°, 54°; September, 64°, 44°.

Portland canal.—The sun's rays in August, between 9 a.m. and 3 p.m., were very powerful, and, reflected from the snow, caused occasionally intense heat. When the sun was obscured by the mountains, the atmosphere at once conveyed a sensation of chillness. During that month, just before sunrise, the thermometer registered 32° Fahrenheit, water left in basins within the tent being frozen during the night. The vapour developed by the heat of the sun during the early portion of the day, becoming condensed on the mountainous shores of the inlet, usually fell as a drizzling rain from 3 p.m. to about midnight.

Temperature of the surface water, within 20 miles of the head of the canal, was 33°. At that distance from the mouth of the Bear river the water on the surface was fresh.

Queen Charlotte islands.—The climate of Queen Charlotte islands and the off-lying islands of the coast of British Columbia is influenced by the warm body of water which washes their shores, and the winter is less severe and the climate is milder on the islands than within the inlets. The vapour arising from this body of warm water is condensed upon the high mountains which form the shores of the mainland, and falls in drizzling almost constant rain so prevalent in these waters.

Ice.—The Fraser river is, as a rule, frozen over at New Westminster, from January to early in March, during which time sleighs run to Langley. The lakes in the vicinity are frozen over, and ice forms at the head of the several inlets where the water is comparatively fresh, but on the coast it does not form sufficiently thick to impede navigation.

Within the inlets on the coast, north of Vancouver's island, ice is formed during the winter of from 8 to 12 inches in thickness, and occasionally extends as far as 25 miles from the heads of the inlets.

The Skeena and Nass rivers are frozen over during the winter, the former as far as six miles below port Essington, and the latter, in severe weather, down to its mouth.

Rainfall.—The average rainfall appears to be about 55 inches; heavy rains generally occur in December and January.

The following Table shows the principal meteorological features at Esquimalt, Vancouver island, during the years 1870 and 1871.

Month.	Barometer (mean height).	Thermometer.		Temperature of sea.	Prevailing wind.	——
		Max.	Min.			
January -	30·021	51·5	23·5	43·4	North & N.Ely.	
February -	29·970	50·5	29·5	43	Easterly.	
March -	29·921	59	34	45·4	S.Ely. & Westly. -	Rainy month.
April - -	30·037	61·5	43·5	48·2	S.Ely. & S.Wly.	
May - -	30·009	62·5	46·5	51·7	S.Ely. & Southly.	
June - -	29·989	68	52·5	53·2	S.Ely. & S.Wly.	
July - -	30·043	68·5	54·5	57·4	S.Ely. to Westly.	
August -	30·039	72	55	58·9	S.Ely. to Westly.	
September -	30·018	65	50	55·4	S.Wly. variable -	Fogs during latter part of month.
October -	30·037	60·5	45·5	49·1	Variable - -	Fogs and frequent rains.
November -	30·059	61	40·5	46·7	Easterly. (N.E. to S.E.)	
December -	30·066	59	28·5	45·1	Easterly.	

FOGS.—Juan de Fuca strait.—Although fogs in this region are not of such frequent occurrence as on the neighbouring coast of California (where they prevail almost uninterruptedly during summer, and as late as the middle of October), yet from August to November* they occur in Juan de Fuca strait, and are sometimes very dense over the entrance for several days together. They are generally accompanied by calms or very light winds from N.W., which renders them the more dangerous to sailing vessels closing the land.

Coast north of Vancouver island.—Fogs are prevalent especially during the summer months. The north-west winds which prevail during that season, condense the vapour which arises from the comparatively warm water surrounding Queen Charlotte islands and the coast of

* Fogs were very prevalent in November, especially on the south shore of Juan de Fuca strait.—Commander Edwards, R.N., H.M.S. *Mutine*, 1884.

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* H.M.S. *Rocket* experienced light winds from S.E. to S.W., and calms during the months of August and September.

COLDEST WEATHER IN MEMORY OF INDIANS

More Ice at Mouth of Skeena River Than for Many Years.

(Special Correspondence.)

Prince Rupert, Jan. 18.—The weather on the northern coast still remains cold. The Indians state that there has not been a winter with such cold weather within the memory of the oldest inhabitant, and steamship captains, who have navigated these waters for fifteen years, say they never saw the ice at the mouth of the Skeena river in such quantities as at present.

After being isolated in Port Essington for ten days owing to the ice-blockade, a small party of travelers reached Prince Rupert on Thursday on the steamship Coquitlam, which brought them over from Claxton Cannery. They had stopped off at Port Essington intending to take the next boat out, but the next boat never came. Realizing that it might possibly be weeks before another steamer would reach the town, the little party determined to walk out. With the river piled high with crunching cakes of ice, escape in that direction was cut-off, so shouldering their packs they started on a ten mile mush over the hills to Claxton, a point that is usually free from ice and easily reached by boat in summer. After beating their way through the pathless woods they finally reached Claxton just in time to catch the Coquitlam which had fortunately called there for fresh water, and were brought here tired and weary but none the worse for their long tramp.

The big barge Georgian loaded with two steam-shovels, four pony locomotives and about 40 dump-cars in tow of McKenzie Bros.' tug Escort No. 2 has arrived from New Westminster. The outfit was consigned to Foley, [illegible] Stewart and will be used by D. [illegible] who has a piece of railway construction work near Porpoise Harbor at the southern end of Kaien Island. [illegible] generally

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Alaska. During the prevalence of north-west winds this vapour is dispersed, but during calms or with light winds, and especially with south-westerly winds succeeding north-west winds, it approaches quickly from seaward in the form of dense fog, or drizzling mist and rain.

At times fog will be found at the entrances to the sounds during the forenoon, dispersing near noon by the heat of the sun, the afternoons becoming clear and fine.

Smokes from forest fires cause much inconvenience during the dry season, and are a great impediment to navigation. In some seasons they have extended from the Gulf of Georgia to Portland inlet.

WINDS.—Juan de Fuca strait.—Within the strait of Juan de Fuca, in the winter season, the winds usually assume its direction either up or down. During summer, the prevailing winds from N.W. or S.W. take a westerly direction within the strait; while the S.E. gales of winter blow fairly out.

Although a westerly wind may be blowing within the strait, it frequently during the change of the seasons blows heavily outside at the same time from S.S.W., or sometimes suddenly changes to that direction, from a light easterly wind on opening the entrance, which makes that part of the coast of Vancouver island between port San Juan and Bonilla point a dangerous lee-shore to a ship without steam power.

The coast winds in summer prevail from S.W. and N.W.,* the former during the early months, and the latter blowing fresh and with great regularity during June, July, and August. In September and the early part of October the winds are very uncertain, and there is generally a great deal of calm, gloomy weather.

The barometer usually stands above 30·00 inches during summer; should it fall to 29·90 a south-easterly wind with thick rainy weather may be expected, but of short duration and clearing up with a westerly wind as soon as the barometer rises.

The winter winds are S.E. or S.W., more frequently the former; they set in towards the end of October, and continue until the middle of April. S.E. gales are generally preceded by a short interval of calm, cloudy weather; they spring up gradually from East or E.S.E. veering to the southward, accompanied by rain and thick weather, the barometer falling rapidly; when the barometer becomes stationary the wind shifts suddenly to S.W. and blows heavily with clear weather, but with frequent squalls of rain; the barometer begins to rise immediately the wind veers to S.W., from which quarter it generally blows from 12 to 20 hours.

* H.M.S. *Rocket* experienced light winds from S.E. to S.W., and calms during the months of August and September.

The violence and duration of these S.E. gales is always proportioned to the fall of the mercury; with the barometer at 29·50 a strong gale may be looked for from this quarter; it seldom falls below 29·20, when very bad weather is certain to follow. On two or three occasions in as many years it has been known to fall to 28·90, and has been followed by S.E. gales of great violence.

A S.E. gale sometimes springs up, though very seldom, with the barometer above 30·00 inches. On such occasions the wind has always been preceded by calm, cloudy weather and rain, with a high but falling barometer; such gales are not violent and are of short duration.

S.E. gales are always accompanied by thick dirty weather, and rain; but they seldom continue from that quarter for more than 12 or 18 hours, unless the barometer falls very low, and they almost always shift to S.W.

When the S.W. gale of winter is not preceded by one from S.E., the barometer seldom falls; it either remains stationary, when the gale may be expected to continue longer, or rises slowly, when it will gradually subside and fine weather follow. S.W. gales are accompanied by heavy banks of clouds, with passing showers of rain, and sometimes snow.*

The barometer has been known to fall during winter as low as 29·45, and has been followed by no gale or bad weather, but on such occasions there has been a heavy fall of snow on the hills, and a sudden fall of 15° in the temperature.

A fine northerly or N.E. wind frequently occurs at intervals during the months of December, January, and February; it is always accompanied by a high barometer (above 30·0), and at such times a continuance for several days together of clear, cold, frosty weather may be looked for; the barometer on these occasions will sometimes rise as high as 30·70, and the fine weather will then probably last a fortnight or more.

Strait of Georgia.—The prevailing summer wind in the strait of Georgia is from N.W., or the same as on the outside coast, and between May and September it blows strong and steady, commencing about 9 a.m.

* H.M.S. *Shearwater* in 1866 experienced a heavy S.W. gale lasting 48 hours (31st January to 3rd February), weather thick and overcast, accompanied by heavy squalls of sleet and hail, and falling barometer; the wind then shifted to N.W., from which quarter it continued to blow with the same violence for 12 hours, the barometer rising; the wind then backed to S.W. and South, the barometer fell rapidly from 30·27 to 29·69, and the squalls were of great violence.

On the 5th and 6th February the wind veered to W.S.W. and W.N.W., continued to blow heavily, but barometer rose, and atmosphere became clearer. On the 7th the wind fell and shifted to the South, the weather again becoming thick, dirty, and rainy, but the barometer rose rapidly. This was followed on the 8th by a heavy gale of 12 hours duration, which commenced at S.W. and shifted to S. and S.E., the barometer again falling to 29·80.—Commander T. Smith, R.N., H.M.S. *Shearwater*, 1866.

and dying away towards sunset. These winds do not generally extend much below point Roberts, among the Haro archipelago they become variable and baffling, while in the main channels of Rosario and Haro the westerly wind entering the strait of Fuca is deflected to S.W., and vessels running up these channels with a fair wind almost always find it ahead on entering the strait of Georgia. During winter there is a good deal of moderate, calm, and gloomy weather, but gales from S.E. and S.W. are frequent.

Coast north of Vancouver island.—The prevailing winds during the summer on the coast northward of Vancouver island are from the north-west, preceded during the earlier summer months by south-westerly winds.

During the winter months S.E. and S.W. winds prevail.

Gales from the S.E. prevail at all seasons, and are more frequent and severe than those experienced on the coast of Vancouver island. The summer gales are of shorter duration than those of winter, and seldom last more than 48 hours. At the fall of the year, gales lasting for 8 days, from the S.E. have been experienced.

The strength of the summer winds depends greatly upon local circumstances. Down the channels, which lie in a N.W. and S.E. direction, with high land on both shores, they frequently blow with great strength. The wind usually begins at sunrise, increases in strength throughout the day until about 3 p.m., and then gradually declines towards sunset. The nights as a rule, are calm during the summer months; but, if the wind prevail but slightly from the N.W. during the night, it will probably blow hard from that quarter on the following day.

The barometer stands at about 30·10 during the prevalence of N.W. winds. Gales from the south-east are usually preceded by a falling barometer, but not invariably. A sensation of dampness in the atmosphere is the usual precursor, and the reading of the wet and dry bulbs, though as a rule not differing greatly upon this coast, more closely approximate each other.

If during the summer the barometer fall one tenth of an inch, especially if it has been standing at higher than 30·20, a gale from the south-east is probable.

These gales usually begin at E.S.E., veering to the southward with a falling barometer; the wind remaining at S.E. and S.S.E. for a long or short period according to the season of the year. With a rising barometer the wind shifts to the S.W. with violent squalls, and then hauling more westerly blows itself out. A strong S.E. gale, of short duration, has been experienced, during the summer, with the barometer previously registering 30·17 and falling to 30·12.

Queen Charlotte islands.—South-east winds are prevalent, and are almost invariably accompanied with thick rain; those from the opposite quarter generally bring fine weather. The weather is uncertain, and cannot be depended on for 24 hours at a time.

The heaviest rainfall is local, taking place on the western mountains of Queen Charlotte islands. It may often be noted that while heavy rain is falling on the mountains the sky is comparatively clear over the strait to the eastward. From this circumstance the north-east part of Graham island is not subject to a heavy rainfall. Snow occasionally falls in winter.

CURRENTS.—A south-easterly current has been found to prevail on the western coast of Vancouver island more or less throughout the year, particularly from August to November, probably in some measure caused by the N.W. winds which blow almost constantly on the coast during the summer. This current joining the ebb tide out of Fuca strait has been known to set vessels between 4 and 5 miles an hour to the south-eastward, and during fogs there is great risk of being drifted on to cape Flattery, or some of its off-lying dangers; extreme caution should therefore be observed in entering the strait at such times, especially near the full and change of the moon when the tides are at their strongest. With winds from the south-eastward in the offing, however, this southerly set has been checked, and near the coast a set to the northward experienced.*

TIDES.—It is high water, full and change, at cape Flattery at noon, the ebb stream commencing to run strong at 2h. p.m. and continuing for about 6 hours.

In the outer part of Juan de Fuca strait there is no very great strength of tide; it varies from one to 4 knots, seldom so much as the latter unless near cape Flattery; but when approaching the more contracted part in the neighbourhood of the Race islands, which receives the first rush of the pent up waters of the strait of Georgia, strengthened and diverted by the labyrinth of islands which choke up its southern entrance, it is not surprising that eddies, races, and irregularities occur that almost baffle any attempt at framing laws which may not rather embarrass than assist the seaman; the result, however, of observations continued throughout an entire year at Esquimalt, and partially on other parts of the coast during three seasons, appears to warrant the following conclusions, viz.:—

The flood tide sets to the northward along the outer coast of the continent and Vancouver island. It enters the strait of Fuca at cape

* In July 1873, H.M.S. *Repulse* experienced a northerly set of one knot an hour and S.E. winds, at 300 miles from cape Flattery.—Captain C. T. Curme, R.N.

H.M.S. *Heroine* in 1883 also experienced a current setting in the same direction.—Navigating Lieutenant Hatch, R.N.

Flattery, running with considerable velocity, sometimes 3 or 4 knots, over Duncan and Duntze rocks; it then turns sharply into the strait, passing through the various channels among the Haro archipelago into the strait of Georgia, and between cape Mudge and cape Lazo at a distance of from 5 to 20 miles from the former, according to the phases of the moon and the state of the winds, it is met by a flood from the northward, which, sweeping the western coast of Vancouver island, enters Goletas channel and Queen Charlotte sound at its northern extreme, in lat. 51° N., thence southerly down the narrow waters of Johnstone strait and Discovery passage, meeting the tide which enters by Fuca strait, and reaches about midway between the northern and southern extremes of Vancouver island, or close to the spot where the broad expanse of the strait of Georgia merges into the narrow channels adjoining it.

On the western side of Vancouver island the tides are regular; flood and ebb of six hours duration, the times of high water on the full and change at Nootka sound, and at the entrance of Goletas channel, varying very little, and occurring near noon, the greatest range 13 feet. Nor is any marked irregularity observable in Johnstone strait and Discovery passage, except the not unusual circumstance that the ebb stream continues to run to the northward for two hours after it is low water by the shore, the water rising at the same time; the ebb stream being of seven hours duration, the flood about five hours.

The great and perplexing tidal irregularities may, therefore, be said to be embraced between the strait of Fuca, near the Race islands, and cape Mudge, a distance of 150 miles; and a careful investigation of the observations made at Esquimalt, and among the islands of the Haro archipelago, shows that during the summer months (May, June, and July) there occurs but one high and one low water during the 24 hours; high water at the full and change of the moon happening about midnight, and varying but slightly from that hour during any day of the three months; the springs range from 8 to 10 feet, the neaps from 4 to 5 feet. The tides are almost stationary for two hours on either side of high or low water, unless affected by strong winds outside.

During August, September, and October, there are two high and two low waters in the 24 hours; a superior and an inferior tide, the high water of the superior varying between 1h. and 3h. a.m., the range during these months is from 3 to 5 feet, the night tide being the highest.

During winter almost a reversal of these rules appears to take place; thus, in November, December, and January, the 12-hour tides again occur, but the time of high water is at or about noon instead of midnight.

In February, March, and April, there are two tides, the superior high water occurring from 1h. to 3h. p.m. Thus in summer months the tides are low during the day, the highest tide occurring during the night, and

in winter the tides are low during the night, the highest tide occurring during the day.

The ebb stream has always been found to run southward through the Haro archipelago, and out of Fuca strait for 2½ hours after it is low water by the shore, the water rising during that time; the ebb is stronger than the flood, and generally two hours longer duration.

The tides during those months when two high and two low waters occur in the 24 hours, are far more irregular than when there is only one 12-hour tide, and another anomaly exists, viz., the greatest range not unfrequently occurs at the first and last quarters, instead of at the full and change of the moon.

Strait of Georgia.—The tides, although not nearly so strong as among the Haro archipelago, yet run with considerable strength, as much as 3 knots, particularly during the freshets of summer, when the Fraser river discharges an immense volume of fresh water, which takes a southerly direction over the banks, and almost straight for the mouth of Active pass. This peculiar milky-coloured water is frequently carried quite across the strait, and is sometimes seen in the inner channels washing the shores of Vancouver island; at other times it reaches the centre of the channel only, forming a remarkable and most striking contrast with the deep blue waters of the strait of Georgia.

Hecate strait.—In Hecate strait the flood tide comes from the southward. In Dixon entrance, the flood coming from the westward round North island, sets along the Masset shore, across Hecate strait for Brown passage, spreading for about 15 miles round Rose point towards cape Ibbetson (Edye passage), where it meets the flood from the southward; consequently between Rose point, cape Ball, cape Ibbetson, and thence south-east 15 or 20 miles, the tides are irregular.

The course and rate of the tidal streams are not regular, being greatly influenced by the winds. At full and change they run with great strength. Time of high water over the strait generally is about 0h. 30m.

Between cape Murray, Percy point, and Zayas island the tides are the strongest and most irregular, causing a heavy and confused sea, so much so, that in bad weather it has the appearance of breakers.

PASSAGES.*

VANCOUVER ISLAND to VALPARAISO (Sail or Auxiliary Steam).—In winter S.E. and S.W. winds prevail on the coast of California as far south as about lat. 25° N., and vessels bound from Vancouver island to Valparaiso at that season should stand down

* *See* Admiralty Atlas:—Wind and current charts for Pacific, Atlantic and Indian Oceans. January 1879.

KELP will be seen on the surface of the water, growing on nearly every danger with a bottom of rock or stones, during the summer and autumn months; but during the winter and spring this useful marine plant is not always to be seen. It should be an invariable rule never to pass through kelp. In general, by keeping clear of kelp you keep clear of danger, but this must not prevent attention to the lead, as the rule sometimes fails; kelp is always a sign of danger, and unless the spot where it grows has been carefully sounded, it is not safe for a ship to pass over it. A heavy surge will occasionally tear the kelp away from rocks; and a moderate stream will ride it under water, when it will not be seen. In passing on the side of a patch of kelp, from which the stems stream away with the current, care should be taken to give it a wide berth, because the kelp showing with a strong tide is on one side of and not over the rocks. The least water will usually be found in a clear spot in the middle of a thick patch of fixed kelp. p. 12.

Ducie island, and standing to the south-east cross the meridian of Easter island in about lat. 33° S. and the 100th meridian in lat. 36° S. Calms, and variable winds will be experienced in the vicinity of the 30th parallel settling into the north-west quarter as the vessel gets more to the southward, and on this account the 100th meridian should never be crossed northward of lat. 36° S. The 40th parallel should be reached before making easting, thence steer to pass southward of Juan Fernandez and on to Valparaiso.

In November 1872, H.M.S. *Scylla* went to the parallel of 41° S. before making Easting, accomplishing a good passage of 46 days.

In summer.—In summer a course further west may be pursued, passing the latitude of San Francisco in about 130° W. Thence a sailing vessel should be kept further from the land to avoid the calms and light variable winds experienced at this season along the coast of lower California and in the bay of Panama. After meeting the north-east trade wind in about lat. 30° N. the vessel should stand to the southward, making a south (true) course on the meridian of 125° W. not only to avoid the calms above mentioned, but also the hurricanes which during August and September are liable to be met with eastward of that meridian.*

* Occasionally, but rarely, they are met with west of long. 125° W.

in winter the tides are low during the night, the highest tide ... during the day.

The ebb stre... Haro archipelag... by the shore, th... the flood, and g...

The tides dur... in the 24 hour... 12-hour tide, ar... unfrequently occ... change of the mo...

Strait of G... among the Haro... as 3 knots, partic... river discharges a... direction over the... This peculiar mil... strait, and is some... Vancouver island; ... forming a remark... waters of the strait...

Hecate strai... southward. In D... ...ows the westward round North island, sets along the Masset shore, across Hecate strait for Brown passage, spreading for about 15 miles round Rose point towards cape Ibbetson (Edye passage), where it meets the flood from the southward; consequently between Rose point, cape Ball, cape Ibbetson, and thence south-east 15 or 20 miles, the tides are irregular.

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* *See* Admiralty Atlas:—Wind and current charts for Pacific, Atlantic and Indian Oceans. January 1879.

the coast, keeping at about 100 miles from it, until near the latitude of San Francisco, and thence gradually edge to the westward so as to pass westward of and in sight of Guadalupe island, where in all probability the north-east trade wind will be met with. A vessel should then steer to sight Clipperton island, passing westward of it; and in about this latitude the north-east trade wind will be lost. If steam power is available the belt of variable winds and calms, which at this season on the meridian of 120° is 250 to 350 miles wide, should be crossed on a southerly course so as to pick up the northern edge of the south-east trade winds in about long. 110° W. (well to windward); but if depending on sail alone a vessel will probably not be able to cross the equator much to windward of long. 118° W., and every effort should be made not to cross further than that to the westward, as the result would be that the vessel would not weather Elizabeth or Pitcairn islands, in the vicinity of which light baffling winds from South to S.E. would be experienced. The S.E. trade wind at this time of the year will be in all probability met with between lat. 5° N. and 3° N. The higher latitude during the early winter months (November and December), and the lower latitude towards March, when the ship should be kept full, making, as nearly as the wind will permit, a due south (true) course.

In about lat. 6° S. the trade wind generally becomes more easterly in direction, sometimes hauling as far round as E. by N. Cross the 20th parallel (S.) in long. 120° or 121° W. in order to pass well to windward of Ducie island, and standing to the south-east cross the meridian of Easter island in about lat. 33° S. and the 100th meridian in lat. 36° S. Calms, and variable winds will be experienced in the vicinity of the 30th parallel settling into the north-west quarter as the vessel gets more to the southward, and on this account the 100th meridian should never be crossed northward of lat. 36° S. The 40th parallel should be reached before making easting, thence steer to pass southward of Juan Fernandez and on to Valparaiso.

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In summer.—In summer a course further west may be pursued, passing the latitude of San Francisco in about 130° W. Thence a sailing vessel should be kept further from the land to avoid the calms and light variable winds experienced at this season along the coast of lower California and in the bay of Panama. After meeting the north-east trade wind in about lat. 30° N. the vessel should stand to the southward, making a south (true) course on the meridian of 125° W. not only to avoid the calms above mentioned, but also the hurricanes which during August and September are liable to be met with eastward of that meridian.*

* Occasionally, but rarely, they are met with west of long. 125° W.

The north-east trade wind will be lost at this season in lat. 11° or 12° N., and the belt of doldrums will be found to be not so wide as during the winter months. The south-east trade wind will at this season be met with in about lat. 8° N., and if, as is most likely to be the case at the commencement, the wind be well to the southward, the vessel should stand to the eastward in order to recover some of the ground lost by keeping further to the westward in the north-east trades. Endeavour to cross the equator in from long. 118° to 120° W., and soon after crossing, the wind will haul more to the eastward, when stand to the southward to weather Ducie island, and reach the 40th parallel before making easting, so as to fall in with the north-westerly winds, as calms and variable winds are met with north of that parallel. After passing the meridian of 90° W. haul up for Juan Fernandez and thence for Valparaiso.

VALPARAISO to VANCOUVER ISLAND (Sailing).—The best route to pursue when making this voyage is the same at all times of the year. Leaving Valparaiso stand to the north-westward passing to the westward of St. Felix, and crossing the 25th parallel in long. 83° W. After falling in with the south-east trade wind steer to cross the equator in about 112° W. and cross the 122nd meridian in lat. 10° N. After falling in with the north-east trade wind steer to cross the 20th parallel* in long. 133° W. and the 30th parallel in long. 138° W. standing to the westward as far as long. 140° W. in about lat. 35° N. Thence edge away to the eastward, crossing the 40th parallel in long. 138 W., and make for lat. 47° N. long. 130° W. before steering direct for Juan de Fuca strait. (Distance by this route 6,990 miles.)

PANAMA to VANCOUVER ISLAND (Sailing).—A vessel unaided by steam power will experience considerable difficulty and delay in getting out of the bay of Panama, owing to the light baffling winds and calms which are met with there at all seasons. Between October and April the prevailing wind in the gulf is from the northward; for the remainder of the year the wind hangs more to the westward, and land and sea breezes are felt varied by calms and occasional squalls from south-west. Northward of lat. 5° N., between the 80th and 110th meridians, is a region of calms and light winds varied by squalls of wind and rain; but southward of lat. 5° N., between the coast of the mainland and the Galapagos islands, west of the meridian of 80° W., the wind is between South

* In May and June the north-east trade wind is often very weak north of the 20th parallel, and frequently a belt of calm exists between the 20th and 30th parallels. "We steamed from lat. 21° 30′ N. to lat. 32° 10′ N., a distance of 668 miles, through a "length and duration of calm greater than I can ever remember. On no occasion "were the slight flaws of wind more than force 1 or 2."—Captain's Remark Book H.M.S. *Sutlej*, May 1863.

and West all the year round and, except between the months of February and June, is fairly strong.

A vessel should, therefore, at all seasons make the best of her way to the southward, keeping as nearly as possible on the meridian of 80° W. until lat. 5° N. is reached, when, if the wind will allow, make a south-west course,* and should the wind be light and variable with rain make every endeavour to get to the southward. When lat. 2° N. is reached, a vessel may, between June and January, stand to the westward carrying S.W. winds as far as 85° W., after which the wind will haul to the southward and south-eastward settling into the south-east trade wind. Pass northward of the Galapagos islands, keeping on the parallel of 2° N. until the meridian of 105° W. is reached, when edge away to pass westward of Clipperton island, in the neighbourhood of which the north-east trade wind will be met with, when stand to the north-west to cross the parallel of 20° N. in long. 120° W., after which pursue the same course as if bound from Valparaiso. (*See* page 14.)

Between January and April, however, it is better to cross the equator between the Galapagos islands and the mainland before standing to the

VANCOUVER to YOKOHAMA.—Full-powered steam-vessels. — The tracks recommended are as follows:—From Vancouver to Yokohama, during summer months; from Juan de Fuca strait to cross the meridian of 140° W. in lat. 51° N., keeping on that parallel to the 180th meridian, thence steering to cross 160° E. in lat. 48° N., 150° E. in lat. 43½° N., and to make the coast of Japan at Kinkuwasan light in about lat. 38° 20′ N. During winter months the same track to the 180th meridian as above, thence steering to cross 160° E. in lat. 49° N., 150° E. in lat. 44½° N., passing about 50 miles south-eastward of Skotan, and to make the coast of Japan as before at Kinkuwasan light. These routes are usually northward of the westerly winds, and in the track of the cold westerly current throughout. From Yokohama to Vancouver, at all seasons, cross the meridian of 150° E. in lat. 40° N., 160° E. in 44½° N., 170° E. in 47½° N., and the 180th meridian in lat. 49° N.; thence keeping on that parallel to 140° W., and from there steering for the entrance of Juan de Fuca strait. This route is usually in a warm easterly current throughout.* p. 15.

May, inclusive, when the prevailing winds on the west coast of Mexico are

* Should the wind be westward of S.W. stand to the southward but if southward of S.W. stand to the westward.

† These directions are based on the passages made by H.M. Ships *Sutlej*, *Bacchante*, *Cameleon*, and *Tribune*, in the months of March, April, and May, and October to January 1861-66.

* *See* Admiralty charts:—Cape Corrientes to Kodiak island, No. 787; Kamchatka to Kodiak island, No. 2,460; and North-west Pacific ocean, &c., No. 2,459.

The north-east trade wind will be lost at this season in lat. 11° or 12° N., and the belt of doldrums will be found to be not so wide as during the winter months. The south-east trade wind will at this season be met with in about lat. 8° N., and if, as is most likely to be the case at the commencement, the wind be well to the southward, the vessel should stand to the eastward in order to recover some of the ground lost by keeping further to the westward in the north-east trades. Endeavour to cross the equator in from long. 118° to 120° W., and soon after crossing, the wind will haul more to the eastward, when stand to the southward to weather Ducie island, and reach the 40th parallel before making easting, so as to fall in with the north-westerly winds, as calms and variable winds are met with north of that parallel. After passing the meridian of 90° W. haul up for Juan Fernandez and thence for Valparaiso.

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PANAM[illegible] vessel unaided[illegible] delay in getting[illegible] and calms whic[illegible] April the preva[illegible] remainder of th[illegible] and sea breezes[illegible] west. Northwa[illegible] region of calms[illegible] southward of lat[illegible] pagos islands, w[illegible]

* In May and June the north-east trade wind is often very weak north of the 20th parallel, and frequently a belt of calm exists between the 20th and 30th parallels. "We steamed from lat. 21° 30′ N. to lat. 32° 10′ N., a distance of 668 miles, through a "length and duration of calm greater than I can ever remember. On no occasion "were the slight flaws of wind more than force 1 or 2."—Captain's Remark Book H.M.S. *Sutlej*, May 1863.

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A vessel should, therefore, at all seasons make the best of her way to the southward, keeping as nearly as possible on the meridian of 80° W. until lat. 5° N. is reached, when, if the wind will allow, make a south-west course,* and should the wind be light and variable with rain make every endeavour to get to the southward. When lat. 2° N. is reached, a vessel may, between June and January, stand to the westward carrying S.W. winds as far as 85° W., after which the wind will haul to the southward and south-eastward settling into the south-east trade wind. Pass northward of the Galapagos islands, keeping on the parallel of 2° N. until the meridian of 105° W. is reached, when edge away to pass westward of Clipperton island, in the neighbourhood of which the north-east trade wind will be met with, when stand to the north-west to cross the parallel of 20° N. in long. 120° W., after which pursue the same course as if bound from Valparaiso. (*See* page 14.)

Between January and April, however, it is better to cross the equator between the Galapagos islands and the mainland before standing to the westward. Southward of lat. 1° N. the wind will be found to haul to the eastward as the vessel leaves the coast. At this season vessels should keep to the southward of the equator until westward of long. 105° W., when proceed as before directed.

Auxiliary steam.—Vessels with auxiliary steam power bound from Panama to Vancouver island should stretch off on a W. by N. (true) course (or, until the parallel of 12° N. is gained, a little more northerly), passing the meridian of Acapulco in about lat. 13° N. The eastern limit of the north-east trade wind is uncertain, but it will generally be met with in about long. 103° W., *i.e.*, at about 300 miles from the land. When first falling in with it the W. by N. course should be maintained, as by steering more to the northward the trade wind will be found to hang to the north, and north-west. The meridian of 110° W. should be crossed in lat. 14° N., after which steer to cross the 130th meridian in about lat. 30° N., when steer Northward as far as lat. 40° N., or until the westerly winds are reached, and thence gradually edge away for the port.†

VANCOUVER ISLAND to PANAMA (Sailing).—Sailing vessels making this passage between the months of December and May, inclusive, when the prevailing winds on the west coast of Mexico are

* Should the wind be westward of S.W. stand to the southward, but if southward of S.W. stand to the westward.

† These directions are based on the passages made by H.M. Ships *Sutlej, Bacchante, Cameleon,* and *Tribune,* in the months of March, April, and May, and October to January 1861–66.

* *See* Admiralty charts :—Cape Corrientes to Kodiak island, No. 787 ; Kamchatka to Kodiak island, No. 2,460 ; and North-west Pacific ocean, &c., No. 2,459.

from the northward, and the current favourable, should stand down the coast of California, keeping about 100 miles off, and at about 150 miles off the coast of Mexico, shaping a course to make the island of Hicaron, about 50 miles westward from Mariato point, which is a good landfall for vessels bound to Panama from the westward.

Between the months of June and November, inclusive, when calms, variable winds, and oftentimes hurricanes prevail on the west coast of Mexico, sailing vessels should stand well out to sea after passing San Francisco, shaping a course to cross the equator in about long. 104° W., thence standing on to the southward, until sure of reaching Panama on the other (starboard) tack.

Uniform system of buoyage.*—Throughout the ports of British Columbia all buoys on the starboard side of the channel, entering from seaward, are painted *red*, and, if numbered, marked with *even numbers*, and must be left on the starboard hand when passing in.

All buoys on the port side, entering from seaward are painted *black*, with *odd numbers*, if any, and must be left on the port hand when passing in.

Buoys painted with *red* and *black horizontal bands* will be found on obstructions or middle grounds, and may be left on either hand.

Buoys painted with *white* and *black vertical stripes* will be found in mid-channel, and must be passed close to, to avoid danger.

All other distinguishing marks to buoys are in addition to the foregoing, and indicate particular spots; a detailed description of which is given when the mark is first established.

Perches with balls, cages, &c., will, when placed on buoys, be at turning points, the colour and number indicating on which side they are to be passed.

Spar buoys will in some cases be surmounted by a ball, which will invariably be painted *red*, and will indicate that it is a starboard buoy, and must be left on the starboard or right hand when entering a channel or harbour.

The rule for colouring buoys is equally applicable to beacons, spindles, and other day marks, so far as it may be practicable to carry it out.

* Notice to Mariners No. 244 of 1884.—Originally published at Ottawa, dated 1st December 1879.

CHAPTER I.

JUAN DE FUCA AND HARO STRAITS.

VARIATION, 22° 50′ East in 1888.

JUAN DE FUCA AND HARO STRAITS.

JUAN DE FUCA STRAIT,* formed between the south end of Vancouver island and the mainland of Oregon territory, has its entrance between the parallels of 48° 23′ and 48° 36′ N., and on the meridian of 124° 45′ W.; from its geographical position it is liable to all those sudden vicissitudes of weather common to high northern latitudes; and in few parts of the world is the caution and vigilance of the navigator more called into action than when entering it.

The breadth of the strait between cape Flattery,† its southern point of entrance, and Bonilla point on Vancouver island (its northern), is 13 miles; within these points it soon narrows to 11 miles, and carries this breadth in an easterly direction for 40 miles, or until Race islands bear N.E. by E., distant 10 miles; it then takes an E.N.E. direction for a farther distance of 14 miles to the shore of the continent, or more properly Whidbey island.

Between Race islands and the southern shore the strait is 8 miles wide, after which it immediately expands to 17 miles, leading northwards to the British possessions by various channels among the labyrinth of islands known as the Haro archipelago, and southward to those of the United States, by Admiralty inlet and Puget sound.

The coasts of Fuca strait are free from danger, and may be approached safely within half a mile; there is, however, a rock on which the sea breaks lying nearly that distance off the west point of Crescent bay on the southern shore. The strait in the centre is of great depth, but within 1½ miles of either shore there is generally under 40 fathoms, and on the northern side when 5 miles eastward of port San Juan, 8 to 12 fathoms water will be found within one mile of the shore, and, if necessary, vessels may anchor. On both sides of the strait there are several anchorages or stopping places which may be taken advantage of by vessels, either inward or outward bound, when meeting with adverse winds; those on the southern side, before reaching the harbours of Admiralty inlet, are Neeah and Callam bays, port Angelos, New Dungeness bay, Washington harbour, and port

* *See* Admiralty charts :—Vancouver island and adjacent shores of British Columbia, No. 1,917, scale, $m = 0{\cdot}15$ of an inch; and Juan de Fuca strait, No. 1,911, scale, $m = 0{\cdot}29$ of an inch.

† Flattery was the name given to this cape by Cook in 1788; but Vancouver, in 1792, says it was known to the natives by the name of Classet.

Discovery; on the northern side, before rounding the Race islands, are port San Juan, Sooke inlet, and Becher bay, after which excellent anchorage may be always obtained with westerly winds.

On the northern, or Vancouver island shore of the strait, the hills rise gradually and are densely wooded, but near the coast attain to no great elevation; on the southern side the almost perpetually snow-clad mountains known as the Olympian range, rise more abruptly and vary in elevation from 4,000 to more than 7,000 feet; but though exceedingly grand in their rugged outline, they present no very marked summits as seen from the strait nor any great variety in their features.

LIGHTS.—The strait of Juan de Fuca is fairly lighted. On the island of Tatoosh, close off cape Flattery, is a *fixed* white light of the first order, elevated 162 feet above the mean level of the sea, and should be visible in clear weather from 18 to 19 miles. A white *flashing* light, visible in clear weather at a distance of 19 miles, is also exhibited from cape Beale, distant 13 miles westward from Bonilla point.

At Ediz hook, New Dungeness, and Admiralty head on the southern shore, and on Smith or Blunt island, at the eastern end of the strait, are also excellent lights; while on the northern side is the *flashing* light on the Race islands, Fisgard island light at the entrance of the port of Esquimalt; and the fixed white light on Discovery island; thus after making the light of cape Flattery, there will only be an interval of about 16 miles from losing sight of it, until sighting that of Race islands; and from the latter, Ediz hook, New Dungeness, and Esquimalt lights are visible.

SOUNDINGS.—Between the parallels of 48° and 49° the 100 fathom bank extends for 32 miles off shore, and for 5 or 6 miles on either side of the parallel of 48° 30′, which passes through the centre of Juan de Fuca strait, no greater depth than 55 fathoms is found at the distance of 40 miles from the entrance. Steering for the strait within these limits of latitude, viz. a few miles on either side of 48° 30′, from 55 to 60 fathoms will be carried for 20 miles, the bottom fine dark sand, sometimes varied by gravel and small stones, when it will deepen to 80 and 90 fathoms, generally muddy bottom, for a farther distance of 10 miles; a vessel will then be within 8 or 10 miles of the strait: if to the northward of 48° 30′ the water should shoal to 36 and 40 fathoms rocky or gravel bottom; if to the southward it will continue deep and will increase to more than 100 fathoms, when within 8 or 9 miles of cape Flattery.

The outer edge of the bank is rather steep, falling from 90 to 150 fathoms and then no bottom with the ordinary line. There is one peculiarity which should not pass unnoticed; the deep channel of over 100 fathoms, which runs through the centre of the strait, on entering the ocean is deflected to the southward, probably owing to the superior strength of the ebb stream and the southerly current, and a zone of deep

water about 3 miles in width, with from 140 to 150 fathoms, extends in that direction to the 48° parallel; between it and the shore, a distance of about 8 miles, the depth decreases suddenly to 30 fathoms fine dark sand, and immediately outside it from 67 to 80 fathoms will be found.

CAPE FLATTERY, or Classet, is a remarkable point of land, distinctly seen at a distance of 35 miles, rising gradually from the sea to a thickly wooded mountain nearly 2,000 feet high, with an irregular shaped summit, and falling again at the distance of 3 or 4 miles to the eastward. When seen from the southward or south-west it has the appearance of an island, being separated by a stretch of low land from hills of the same or greater elevation, which rise again immediately southward of it.

On a nearer view, the headland itself, with its wild off-lying rocks over which the sea is almost constantly breaking, presents an uninviting appearance; it is a rugged sea-worn cliff of no great elevation, rising gradually to its more prominent feature, a densely wooded mountain. From the cape the coast trends E. by N. ¾ N. for 4 miles to Neeah bay, and though no dangers exist half-a-mile from the shore eastward from the cape, there is generally a heavy swell with irregular tides, and vessels are by no means recommended to approach it within one mile.

TATOOSH ISLAND, lying half a mile W.N.W. from cape Flattery, is a steep, almost perpendicular rocky islet, bare of trees, and 100 feet high, with some reefs extending a short distance off its western side; the lighthouse known among seamen as cape Flattery light, stands on the summit of the island, which with its outlying reef is the most western portion of the United States.

LIGHT.—From the above lighthouse (which consists of a keeper's dwelling of stone, with a white tower rising above it, surmounted by an iron lantern painted red, its height being 64 feet above the summit of the island), is exhibited a *fixed* white light of the first order, elevated 162 feet above the mean level of the sea, and in clear weather should be seen from a distance of 19 miles. Vessels from the southward will make it before being up with the Flattery rocks.

A sector of *red* light of 7° 15′ is shown from the lighthouse between the bearings of S.E. ½ S. and S.S.E. ⅞ E., covering Duncan and Duntze rocks.

SOUNDINGS.—A bank, with a depth of 13 fathoms, is reported p. 19. to exist in a position situated about N.W. by W. ¾ W. 14¾ miles from cape Flattery lighthouse. H.M.S. *Swiftsure* in 1889 obtained a sounding of 20 fathoms in this vicinity.†

* *See* plan of Duncan rock on Admiralty chart No. 2,531; scale, *m* = 2 inches.

† Remark book, Lieutenant E. Leah, H.M.S. *Swiftsure*, 1889. *See* Admiralty chart:—Juan de Fuca strait, No. 1,911.

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A sector of *red* light of 7° 15′ is shown from the lighthouse between the bearings of S.E. $\frac{1}{2}$ S. and S.S.E. $\frac{7}{8}$ E., covering Duncan and Duntze rocks.

Fog signal.—A steam fog whistle is sounded for *eight seconds* at intervals of *fifty-two seconds*, during thick weather.

Duncan rock* lies one mile N.W. $\frac{3}{4}$ N. from Tatoosh island; it is a few feet above water, but the sea always breaks over it. There is deep water between it and the island, but vessels should not take the passage,

* *See* plan of Duncan rock on Admiralty chart No. 2,531; scale, $m = 2$ inches.

† Remark book, Lieutenant E. Leah, H.M.S. *Swiftsure*, 1889. *See* Admiralty chart:—Juan de Fuca strait, No. 1,911.

unless carried by the tide into such a position as would cause them to incur danger in endeavouring to avoid it.

Duntze rock, on which is a depth of 3 fathoms, lies about one quarter of a mile N.W. ¼ N. from Duncan rock, and the sea frequently breaks on it. The cross sea which is created in this neighbourhood during bad weather strongly resembles heavy breakers, extending a considerable distance across the strait. Sailing vessels are recommended not to approach the lighthouse on Tatoosh island nearer than 3 miles. In the immediate neighbourhood of cape Flattery, and among these rocks, the tides are strong and irregular.

The COAST southward from cape Flattery trends S.S.E. for 25 miles, the land being mountainous and thickly wooded. At the distance of 11 miles are the Flattery rocks, a group of remarkable, bare, rugged islets, the outer rock lying 2½ miles from the shore. At 12 miles from them in the same direction is a remarkable square white rock, nearly one mile from the shore, which, when the sun's rays are reflected on it, is particularly conspicuous. From this rock the direction of the coast is S.E. for 21 miles to Destruction island, and is fronted by numerous wooded islets and rocks extending about half a mile from the shore.

Between Destruction island and cape Flattery, a distance of 45 miles, the depths vary from 15 to 20 fathoms at 2 miles off shore, until northward of Flattery rocks, when the depth somewhat increases.*

Destruction island is 1½ miles long, it is narrow, and lies nearly parallel with the coast at the distance of one mile from it. It has steep white cliffy shores, is over 100 feet high, and covered with grass, but no trees; in the channel between it and the shore is a depth of 12 fathoms.

DIRECTIONS.—Vessels from the southward or westward bound for Fuca strait, except the coasting steamers which all carry pilots, should make cape Flattery; there is no inducement to hug the coast, on which a long rolling swell frequently sets, and this swell meeting the south-easterly gales of winter, causes a confused sea. The cape and its off-lying rocks should not be approached within a distance of at least 3 miles, as the tide occasionally sets over Duncan and Duntze rocks with great velocity (page 11); the southerly current should also be guarded against, (page 10), an additional reason why these dangers should not be too closely approached. It is equally necessary when either entering or leaving the strait to avoid the coast of Vancouver island between port San Juan and Bonilla point, when there is any appearance of bad weather.

It is recommended to pass at the distance of at least 10 miles from the coast, unless working to windward against a fine northerly wind,

* *See* Admiralty chart:—Cape Mendocino to Vancouver island, No. 2,531; scale, *m* = 0·07 of an inch.

which is frequently found during summer, when it may be safely approached within 3 miles or less.*

To vessels making the strait in bad weather it will be more desirable to run in and seek shelter than to remain outside. If the land has been made either to the southward of cape Flattery or on the Vancouver island shore within a moderate distance of the entrance, or if the latitude can be relied upon within 2 or 3 miles, it will be advisable to run for the strait. The powerful light on Tatoosh island will, unless in very thick weather, or fog, be seen from a distance of 15 miles, and as soon as a vessel is actually within the strait she will have comparatively smooth water, with sufficient sea room, and may run boldly up the centre for the Race light, or if preferred, by the assistance of that on Tatoosh island, maintain her position in the strait. It is to be remarked, that when Tatoosh island light is brought to bear to the westward of W.S.W., it becomes shut in by the land about Neeah bay, and that Race island light becomes obscured by Beechey head when brought to bear eastward of E. by N. $\frac{1}{4}$ N. therefore, when either of these lights are obscured, by being shut in by the land before mentioned, the distance from either coast will be accurately judged, and in the latter case a ship will be getting too close to the northern shore.

Coming from the westward with a heavy westerly or north-west gale, thick weather, and uncertain of the latitude, it would be prudent to lay to at not less than 30 miles from the entrance of the strait, or on the edge of the bank of soundings. These gales seldom last more than 12 hours, and if they veer towards the S.W. the weather will clear, and a vessel may immediately bear up for the strait.

With a S.E. gale it is recommended to close the land, as smoother water will be obtained, and the bank of soundings off the Vancouver island shore will give a vessel pretty accurately her distance from the land. Gales from this quarter sometimes continue in the winter season for 30 hours, and when a vessel strikes soundings on the edge of the bank in 90 fathoms, and carries them into 60 she may put her head to the S.W., and will have plenty of room for drift.

It is of great importance in making the strait during bad weather to strike the outer edge of the bank of soundings, as the ship's distance from the land will then be accurately known. It has been already observed (page 18) that after running 20 miles eastward the depth

* Ships nearing the strait in the night, or in thick weather, should be certain of their latitude; and as rocks lie some distance off the coast to the southward of cape Flattery, and it is therefore dangerous to approach, it is safer to be in error to the northward than to the southward. The coast of Vancouver is comparatively bold, the bank of soundings extends a considerable distance from the land, and the light on cape Beale is visible for a distance of 19 miles. The current that is usually found setting across the entrance of the strait to the S.E. should be particularly guarded against.

increases from 55 to 80 and 90 fathoms, which latter depths, if the lead has not been previously kept going, might be mistaken for the outer edge of the bank.

Should a sailing vessel be overtaken by one of those dense fogs which sometimes hang over the entrance of the strait (page 6) she should not close the land, but stand off sufficiently far to avoid being set by the southerly current too near cape Flattery. If a steamer has made the land or light on Tatoosh island, and is certain of her position, she should get the northern or Vancouver island shore aboard, when, with the assistance of the chart and lead, she may feel her way in.* When 8 or 10 miles eastward of port San Juan there is anchoring ground in 12 fathoms one mile from the shore, and if the fog is very dense a stranger should anchor; it must be remarked, however, that not unfrequently the weather is clear a few miles within the strait while the entrance is totally obscured.

NEEAH BAY† is formed between Koikla point and Wyadda island; the latter, half a mile long in a N.W. and S.E. direction, is narrow and covered with pine trees. Koikla point is 4 miles E.N.E. from the lighthouse on Tatoosh island. The bay offers a safe and convenient anchorage to vessels meeting S.W. or S.E. gales at the entrance of the strait, and is sheltered from W. by S. round by south to N.E. The western shore is steep and cliffy, but a reef extends for more than one cable's length off Koikla point, and a sand-bank which dries extends off one-quarter of a mile at low water from the shore abreast the cliffs. The head of the bay is a low sandy beach, on which the surf generally breaks. On the eastern side of the bay off the south-west side of Wyadda island, a rocky ledge and shoal water extend for 3 cables, and the holding ground is not so good on the island side.

Anchorage.—A good berth will be found in Neeah bay, in 6 fathoms sandy bottom, with the outer point of Wyadda island bearing N.E. by N., and Koikla point W. by N.; a short distance within this position kelp grows in large patches all over the bay, and some care is necessary in selecting a berth. Large sailing vessels may anchor in 7 or 8 fathoms a little outside the above bearings, in the centre of the bay, with the outer point of the island bearing N.E. by E.

Directions.—A vessel should leave this bay on any indication of a north-east wind, and if too late, and unable to weather Wyadda island, she may, with the assistance of the chart, run between it and the main; the passage is 2 cables in breadth, and the least water 21 feet; she must, however, be careful to avoid the ledge off the south-west end of Wyadda,

* Sailing vessels, during gales from S.W. or West, lie to under the south shore of the strait inside Neeah bay, in preference to anchoring in Neeah bay.

† *See* Admiralty plan of Neeah bay on chart No. 1,911; scale, $m = 2 \cdot 0$ inches.

and in hauling out should give the eastern side of that island a berth of at least one quarter of a mile. Vessels have ridden out north-west gales close to the south-east end of Wyadda in 6 fathoms water, but it is more prudent to get out into the strait at the commencement of the gale. During strong westerly or south-west gales, or after they have been blowing outside, a considerable swell rolls into the bay, which renders it at such times a somewhat disagreeable though not unsafe anchorage ; small vessels may go close in and get smooth water, even among the kelp which grows in 4 and 5 fathoms water.

Tides.—It is high water at full and change in Neeah bay at 0h. 33m. ; springs rise 7½ feet, neaps rise 6¾ feet.

CALLAM BAY lies 15 miles E. ½ S. from Neeah bay, the intervening coast being nearly straight, and the shore bold. The only remarkable feature is Klaholoh (Seal rock), 150 feet high, lying a short distance off shore at 2 miles eastward of Wyadda island. If a vessel reaches as high as Callam bay, and meets an easterly or south-east wind, she may obtain temporary anchorage and shelter in the centre of the bay in from 8 to 10 fathoms. Callam bay is easily recognized by Slip point its eastern bluff, which is the western termination of a bold coast ridge, about 1,000 feet in elevation.

The COAST from Callam bay continues in the same direction for 8 miles to Pillar point, so called from its terminating in a bare columnar-shaped rock, somewhat remarkable, from its contrast to the general characteristics of the country (thickly wooded from summit to water line), where few objects present themselves by which vessels may accurately fix their positions. The coast on the east side of this point forms a small bight, in which there is a considerable stream and an Indian village, and then trends E. by N. with a gentle curve to Striped peak ; a small river, the Lyre, enters the strait just eastward of a low point 7 miles westward from the peak.

Striped peak is rather remarkable from a landslip occurring down its face ; at 1½ miles westward from the peak, and one-third of a mile off the west point of Crescent bay (merely an indentation) lies a rock on which the sea breaks at low water : this is the only danger which occurs on the southern side of the strait. Westward from this, kelp grows a short distance from the beach on the somewhat sheltered part between Striped peak and Pillar point, and here the depth of water at one mile from the shore varies from 8 to 16 fathoms ; westward from Pillar point it deepens to 40 fathoms, at that distance.

FRESHWATER BAY, at 3 miles eastward from Striped peak, between Observatory and Angelos points, is nearly one mile deep, and more than 2 miles wide in an east and west direction. The two entrance points are E. by N., and W. by S. of each other, and within this line the depth

varies from 6 to 12 fathoms. Observatory point has several rocks short distance off it; the western side of the bay is a high bold shore. Angelos point, the eastern entrance point, is low; the river Ealwha flowing through it, forms a delta, and has caused a bank with a depth of water on it varying from 2 fathoms close in shore, to 10 fathoms at the distance of one mile. Vessels may anchor within the line of the points in from 6 to 9 fathoms.

PORT ANGELOS, or False Dungeness, is 7 miles eastward from the east point of Freshwater bay, the intervening coast forming rather a deep indentation to the southward, off which as little as 3 fathoms water is found nearly one mile from the shore. The north side of the port is bounded by one of those low narrow sand or shingle spits which are a characteristic feature of the country; this spit, which is named Ediz hook, curves from a high bluff in an E.N.E. direction for nearly 3 miles, and forms a large and good harbour. On the north, or spit side, the water is deep, varying from 15 to 30 fathoms; but southward of a line drawn through the centre there is excellent anchorage in from 7 to 10 fathoms in any part of the port. The outer part of the spit is steep-to, and may be rounded close to, after which the port extends for 2½ miles in a westerly direction, by more than one mile in breadth. Although open to easterly winds, they do not blow home. The lighthouse on Ediz hook is a good guide to the entrance.

Water.—Fresh water is to be obtained from streams on the south side of the port.

LIGHT.—From a square white lighthouse, situated at about 80 yards from the extremity of Ediz hook is exhibited at an elevation of 42 feet above the sea, a *fixed* white light, which should be visible in clear weather from a distance of 12 miles. The lantern is painted red.

Fog signal.—During thick or foggy weather, a bell is sounded *once*, at intervals of *fifteen seconds*, from a position 108 yards N.W. by N. from Ediz hook lighthouse.

Directions.—The spit is so low that at times the sea washes over it, and it would be impossible to see it at any distance, were it not for the lighthouse on it. At a distance of more than 2 miles from the shore 14 fathoms will be found N.N.W. from that part of the spit which joins the mainland; and at night vessels should not go within this depth.

NEW DUNGENESS BAY.*—The shore from False Dungeness gradually curves to the N.E., and about 8 or 9 miles from Ediz hook, another long low narrow sand spit covered with grass stretches from the bluff shore in a general N.N.E. direction for 3⅞ miles, forming the north-western side of the roadstead of New Dungeness. A shoal of 2 fathoms extends N.N.E. for half a mile from the end of the point, and a heavy tide

* *See* Admiralty chart:—Admiralty inlet and Puget sound, No. 1,947; scale, m = 0·3 of an inch.

rip runs over it at the change of the currents.* On the inside, one mile from the eastern extremity, another narrow sand spit stretches 1½ miles southward towards the main shore, forming a large inner shoal bay with a narrow opening, through which the water passes as over a rapid; at low tide abreast this point is a small stream, on the western side of which is a bluff 60 feet high, and upon it is a large village of the Clalum indians.

The shore eastward of the stream is low, swampy, and covered with trees and brush; it forms the southern or main shore of the roadstead, and off it are extensive mud flats, which are bare at low water for over half a mile, and extend as far as Washington or Budds harbour; shoal water exists for some distance outside these flats. About 20 fathoms water are found one quarter of a mile south from the lighthouse point, the depth regularly decreasing across the bay, with a soft tenacious muddy bottom.

Water.—Fresh water may be obtained in abundance at the above stream; but boats must obtain their supply at low tide, and come out when the tide has sufficiently risen.

LIGHT.—From a lighthouse, the upper half of which is black, and the lower half white, surmounted by a red lantern, situated at about one-sixth of a mile from the extremity of the point, is exhibited, at an elevation of 100 feet above the mean sea level, a *fixed* white light, which should be seen in clear weather from a distance of 16 miles.

Fog signal.—During thick or foggy weather, a fog-whistle is sounded from a position 130 yards north-eastward from the lighthouse, in the following manner. A blast of *six seconds* duration, succeeded by an interval of *twelve seconds*, then a blast lasting *three seconds* followed by an interval of *thirty-nine seconds*, completing a minute.

Electric telegraph.—An electric submarine cable extends from New Dungeness to Clover point (Vancouver island); there is a smal house on the spit, one mile S.W. of the lighthouse with the words, "cable crossing," on it.

Anchorage.—The usual and best anchorage in New Dungeness bay is to bring the lighthouse to bear about N. ¼ W. half a mile distant, where 8 fathoms, sandy bottom, are found one-third of a mile off the mud flat. With the lighthouse bearing N.W. by N. three-quarters of a mile distant, the same depth and bottom are found, the nearest point of the south shore bearing South, distant 1¼ miles, and the mud flat distant three-quarters of a mile in the same direction; from this position a vessel can readily get under weigh and clear the point. A south-east wind drawing out of the strait blows directly into this harbour, but the bottom will hold any vessel with good ground tackle; the only difficulty will be to get the anchors out of the mud after riding a couple of days to a gale.

* A *red* buoy is moored about 11 cables N.N.E. ½ E. from New Dungeness lighthouse, at the extreme of the shoal extending from the point.

Tides.—It is high water, full and change, at New Dungeness at 3h., and the rise is 5 feet.

WASHINGTON HARBOUR. — The coast from New Dungeness trends to the S.S.E. for nearly 7 miles, and forms a deep indentation, in the western corner of which is Washington harbour, and in the eastern port Discovery. The entrance to the former is almost closed by a long sand spit extending from the eastern side, leaving a narrow channel with only 2 fathoms water, which deepens within to 13 fathoms; therefore, as a harbour, it is of little importance when there are so many good ones in the neighbourhood.

PORT DISCOVERY,* the harbour where Vancouver anchored and refitted his ships, and from whence he commenced his exploration of these regions in May 1792, is an extensive inlet running in a southerly and south-east direction for 6 miles, with an average breadth of 1½ miles; the general depth of water is from 20 to 30 fathoms, but an anchorage may be had on the west side 1½ miles within the entrance in 15 fathoms, close to the shore. The water shoals rapidly towards the head of the port to 10 fathoms, and a mud flat extends about one mile from its head; this, indeed, is the general feature of all the deep water inlets on these coasts, unless the rivers or streams which flow into them are of sufficient magnitude to cause an adequate scouring power, and more equally distribute the deposit which they bring down with them.

Protection island lies immediately off the entrance of the port, and shelters it from north-west winds. The north side of the island is shoal for half a mile off, and there is a 3-fathom patch, named Dallas shoal, bearing N.W. distant 2 miles from its north point; reefs extend also off the east, west, and south points for half a mile, but there are clear deep channels between it and the main; that to the southward being one mile in breadth, and that to the eastward 1½ miles.

A *black* buoy is moored on the extremity of the reef extending from the south end of the island.

Directions.—A spit extends a short distance off Clallam point, the western point of entrance; and in working up, some of the prominent points should not be closely approached, as the soil breaking away from the neighbouring cliffs has formed a bank off most of them.

ADMIRALTY INLET. — At 14 miles E.N.E. from New Dungeness light, is the entrance to Admiralty inlet, between Wilson point on the south and Partridge point on the north, the latter a remarkable sloping

* It is high water, full and change, in port Discovery at 2h. 30m.; springs rise 7 feet.

A *black* and *red* buoy is moored on the edge of the shoal extending from Middle point, 2¾ miles N. by E. ¾ E. from cape George, the north-east entrance point of port Discovery.

cliff of a whitish colour; and here commences that extensive and singular series of inland navigation, which penetrates the continent in a general southerly direction for nearly 90 miles. These waters were first explored by Vancouver, and have since undergone a more detailed examination by the United States Government.*

Buoy.—A *red* buoy is moored on the edge of the bank that extends from Partridge point.

LIGHTS.—Wilson Point.—From the top of the light-keeper's dwelling (white) situated on Wilson point is exhibited, at an elevation of 53 feet above the sea, a *fixed* white light, which should be seen in clear weather from a distance of 12 miles.†

Fog signal. — A steam-whistle giving a blast of *eight* seconds duration each *minute* is sounded in thick or foggy weather from Wilson point.

Admiralty Head.—Also from a light-keeper's dwelling (white) 41 feet high, situated on Admiralty head, which forms the inner eastern entrance point of the inlet, and bears N.E. by E. distant 3¼ miles from Wilson point, is exhibited, at an elevation of 108 feet above the sea, a *fixed* white light, which should be visible in clear weather from a distance of 16 miles.

PORT TOWNSHEND lies just within the entrance to Admiralty inlet, and is the port of entry for Washington territory. Vessels leaving Fuca strait have frequently, when overtaken by a westerly gale, been compelled to bear up and seek shelter in it. Although a safe harbour, from its great extent it is subject to a disagreeable sea during strong winds, and with a strong south-easter landing is frequently impracticable, and a dangerous sea for boats gets up.

The entrance is between Wilson and Marrowstone points,‡ the latter bearing from the former E.S.E. distant 3⅛ miles. At 1¾ miles south-east from Wilson point, and on the same side, is Hudson point, the distance between which and Marrowstone point is 2 miles; and between these two points is more properly the true entrance to the port, which takes a S.S.W. direction for 2 miles, and then S.E. by S. for about 3 miles, the average breadth being nearly 2 miles. The general depth of water is from 9 to 15 fathoms good holding ground; soft mud when within Hudson point.

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* A ridge about one mile wide (Partridge bank), extending 3¼ miles in a W.N.W. and E.S.E. direction, is situated W.N.W. of Partridge point, its eastern end being 1¾ miles from the point. The shoalest part, a small patch of 2¼ fathoms, lies 3⅛ miles W. by N. ½ N. from Partridge point, and 3⅛ miles S.S.E. ½ E. from the lighthouse on Smith island. Depths of 4 and 5 fathoms extend one mile to the north westward of the patch, and the water then deepens to 7 fathoms, this latter depth being found at a distance of 2¼ miles from Smith island; to the south-eastward of the patch the depths are 7 and 9 fathoms.

A *black* buoy is moored on the north-western edge of the patch of 2¼ fathoms.

† A new *red* stake light is exhibited on the point, S.S.E. ¾ E. distant 1$\frac{6}{10}$ miles from Wilson point lighthouse.

A new *red* buoy has been moored S.E. ¾ S. 1½ miles from Wilson point lighthouse.

‡ Marrowstone, Bush, No point, West and Pull points are all very low spits. Commander Edwards, R.N., H.M.S. *Mutine*, 1884.

Wilson point is low, with sand hillocks on its extreme; a shoal spit extends for nearly half a mile off it, and vessels are recommended to give it a berth of nearly one mile in rounding; the tides are strong, and when blowing fresh, a heavy ripple occurs in the neighbourhood.

Anchorage.—At half a mile within Hudson point there is good anchorage off the houses on the western side of the port, in 10 fathoms at half a mile from the shore. During winter, S.E. gales are not unfrequent, and ships are recommended at this season to anchor farther off shore; the low sand hummock on the extreme of Wilson point, just in line with, or shut in by the high part of Hudson point, bearing N. by W. ½ W., is a good berth in 12 or 14 fathoms, about one mile from the shore.

Tides.—It is high water, full and change, at port Townshend at 3h. 49m.; springs rise 5½, neaps 5 feet.

HOOD CANAL.—Southward from port Townshend, Admiralty inlet continues as a broad deep channel as far as Foulweather bluff distant 10 miles: here a branch named Hood canal takes a nearly due south direction for 40 miles, suddenly turning to the north-east for a further distance of 10 miles, and terminating in Lynch cove. The average width of this inlet is only a little over one mile, but the water in it is very deep, there being depths of from 50 to 60 fathoms throughout its greater part. The main arm of Admiralty inlet continues in an E.S.E. direction for about 8 miles from Foulweather bluff,* it then trends S.S.E. for a distance of 22 miles to the north end of Vashon island, where a branch named Colvas passage takes a S. by E. direction for 11 miles to the entrance of the narrows leading into Puget sound.

Point No point.—At 3¾ miles E. ¼ S. from Foulweather bluff is point No point, a low spit jutting out from the foot of the cliffs.

LIGHT.—From a white lighthouse 20 feet high, situated on point No point, is exhibited, at an elevation of 27 feet above the sea, a *fixed* white light, which should be visible in clear weather from a distance of 10 miles. The lantern and dome are painted red.

Fog signal.—A bell is sounded from the outer end of No point spit during thick or foggy weather; it is struck by machinery giving a single blow every *ten seconds.*

Port Madison is situated on the western shore of Admiralty inlet at about 11 miles S.S.E. from point No point, and on the southern shore of an open bay in which the water is deep.

West point.—On the east shore of Admiralty inlet, about 4 miles E.S.E. from port Madison, is low and projects to the eastward.

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* A *black* buoy is moored on the extremity of the shoal extending about half a mile to the northward from Foulweather bluff.

LIGHT.—From a square, white, light-tower (with red lantern) situated on the extremity of West point is exhibited, at an elevation of 20 feet above the sea, a *flashing* light showing alternately *red* and *white* every *ten seconds*, which should be visible in clear weather from a distance of 10 miles.

Fog signal.—From a frame building, one story high, painted white with a brown roof, situated between the lighthouse and the keeper's dwelling, a steam trumpet is sounded during thick or foggy weather giving blasts of *five seconds* duration with intervals of *twenty-five seconds*.

Directions.—Vessels from the northward after passing point No point at about one mile distant, should steer S.E. ½ S. until West point lighthouse bears S. by E. ¾ E., when alter course to S. by E. After passing the lighthouse, which should be given a berth of one-third of a mile, bring it to bear N. by E., when steer E. ½ S. for Seattle harbour (Duwamish bay), passing Magnolia point at the distance of at least half a mile.

Tacoma, a town which is rapidly increasing in importance and size, is situated on the south side of Commencement bay, at the head of Admiralty inlet. It is the terminus of a trans-continental railway, and a new pier has been built for the shipment of wheat.

The anchorage is very indifferent. H.M.S. *Caroline* anchored in 26 fathoms, sand, with the railway pier bearing West, and Brown point N.N.W. ¾ W. about three-quarters of a cable from the edge of the bank, on approaching which the water shoals rapidly.*

PUGET SOUND.—The inlet, from Defiance point is known as Puget sound; its general direction is southerly and south-westerly for upwards of 30 miles, and is split up into numerous channels and inlets towards its head, in most of which there is deep water.

At the head of the sound is the town of Olympia.

LIGHTS.—*See* footnote.†

Fog signal.—On Robinson point (Maury island), Admiralty inlet, a steam whistle, which gives blasts of *six seconds* duration at intervals of *fifty-four seconds*, is sounded in thick or foggy weather.

North shore of FUCA STRAIT.—PORT SAN JUAN‡ is the first anchorage on the north shore within the entrance of Fuca strait. The opening, which is remarkable from seaward, is seen for a considerable distance, and appears as a deep gap between two mountain ranges; the centre of the entrance bears N.N.E. ½ E. distant 13½ miles from the lighthouse on Tatoosh island, and as the light is visible from the anchorage it is not difficult to enter or leave during night time.

Owen point, at the western entrance to the port, has at a little more than one cable's length from it, a low flat rock named Owen island, awash at high water.

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* Lieut. R. ff. Powell, R.N., H.M.S. *Caroline*, July 1887.

† At Battery point, a white stake light is exhibited.
At Robinson point, a *red* stake light is exhibited.
At Brown point, a white stake light is exhibited.
On north side of Eagle island, a white stake light is exhibited.
On Dofflemyer point, a white stake light is exhibited.

‡ *See* plan of port San Juan on Admiralty chart No. 1,911; scale, *m* = 1 inch.

Observatory rocks, off the eastern entrance point, are high pinnacles with two or three trees growing on them, and some smaller rocks off, the outermost of which lies 1½ cables from the shore. At 4 cables within these rocks and 1½ cables from the shore is another reef partly out of water, named Hammond rocks.

The entrance points lie E. ½ N. and W. ½ S. from each other, distant nearly 1½ miles; the port runs nearly straight for 3½ miles in a N.E. by N. direction, and carries its breadth almost to its head, which terminates in a round beach composed of muddy sand. Gordon river enters the port through the north end of this beach, and Cooper inlet penetrates its southern; very small coasters may enter them towards high water, and find depth and shelter within.

On the north side of the port some rocks and broken ground extend for one mile within Owen point, and nearly 2 cables' lengths from the shore; one rock, awash, lies 4 cables N.E. ¼ E. from Owen island, and is distant 2¾ cables from the shore.

Anchorage.—The port is entirely open to south-west winds, and a heavy sea rolls in when a moderate gale is blowing from that direction; and though it is possible that a vessel with good ground tackle would ride out a gale if anchored in the most sheltered part, it is by no means recommended to remain* with any indication of such weather, but to weigh immediately, and if outward bound seek shelter in Neeah bay, the entrance of which lies 10½ miles S. by W. from port San Juan. There is a convenient depth of water all over port San Juan, from 6 to 9 fathoms, the bottom fine muddy sand: when within three-quarters of a mile of the head it shoals to 4 fathoms, and here in heavy gales the sea breaks; a flat runs off 3 cables' lengths from the head. In the outer part of the port there is generally a swell. Good anchorage will be found about 1¼ miles from the head, with Owen island bearing S.W., and Adze head E.S.E., in 7 fathoms.

The hill named Pandora peak does not show as a peak within the port.

The COAST.—From port San Juan the shore of Vancouver island trends East to Sherringham point, distant 24 miles, and presents no very remarkable features; the country is thickly wooded, and the land rises to a considerable elevation. Providence cove, accessible only to boats, lies 3 miles eastward from San Juan; at the distance of 4½ miles farther east, in a small bight, is a stream named Sombrio river. The river Jordan, a considerable stream, is 5½ miles westward from Sherringham point; between the latter and Sombrio river, depths of from 7 to 10 fathoms will be found

* H.M.S. *Tribune* lost both bower anchors here, in 1863, in consequence of a S.W. gale suddenly springing up.

at one mile from the shore; and off the river Jordan the latter depth extends for more than 2 miles.

Eastward from Sherringham point the shore curves a little to the northward, and at the distance of 4½ miles is Otter point; the points on this side of the strait are not remarkable nor easily distinguished unless close in shore, some of their extremes are partially bare of trees. From Otter point, the entrance to Sooke inlet is E. by N. ½ N. 3¾ miles, the intervening coast forming rather a deep indentation named Sooke bay, in which vessels may anchor in fine weather, at something more than half a mile from the shore in 8 fathoms.

Caution.—Vessels running or working up the strait at night, should be careful not to get so near the north shore as to shut in Race island light by Beechey head.

SOOKE INLET* is a remarkable sheet of water, the outer entrance to which, between Parsons and Company points, is little over half a mile in breadth, and the bar has only a depth of 14 feet on it at low water. Within the bar, the entrance proper, between Whiffin spit and Entry ledge, has 7 fathoms water, but is only 70 yards across, with a sharp turn and strong tide. Thence a narrow and tortuous channel 2½ miles in length, with a general north direction, leads to a beautiful land-locked basin, nearly 2 miles in extent, east and west, and one mile north and south, with a depth of from 8 to 16 fathoms all over it. Independently, however, of strong tides, and several sharp turns, which vessels would have to make in entering, the breadth of the deep channel seldom exceeds half a cable, and is consequently only adapted for coasting vessels or small steamers, unless at considerable inconvenience and loss of time.

Gold was discovered on Leech river in 1864, and on the east side of the entrance to Sooke inlet is a copper and iron mine. There are also indications of coal in the district.

Anchorage.—Vessels may anchor outside in 10 fathoms half a mile off the entrance; or, if necessary, run inside Whiffin island, where there is sufficient space to anchor; care must, however, be taken as to the depths on the bar, and to the state of the tide in the entrance proper, where the ebb at springs runs about 3 or 4 knots.

Whiffin spit is low, gravelly, and connected with the western entrance; its eastern point bears N.N.E. distant three-quarters of a mile from the centre, between the two entrance points; it must be rounded close, as a reef (Entry ledge) lies only half a cable eastward from it. On rounding the point drop the anchor at one cable's length within, in 8 fathoms water; here there is a space of deep water 2 cables in extent.

* *See* Admiralty plan of Sooke inlet, No. 1,907; scale, $m = 4$ inches.

Tides.—During the winter months the rise of tide in Sooke inlet is said to be 10 feet, and it remains high water during the whole of the day. At the entrance the flood and ebb streams run one hour after high and low water at the rate of 3 to 4 knots during springs. It is high water, full and change, at 2h. 0m.

Secretary island, 120 feet high, small and wooded, lies 4 cables S.E. by E. from Possession point, and one mile south-eastward from Sooke inlet. There is a depth of 16 fathoms between it and the main shore, from which it is distant 1½ cables, and from it Beechey head bears E. ⅓ S. distant 2½ miles, with a bold steep shore between, and deep water close-to.

BECHER BAY.*—Beechey head is a bold wooded cliff forming the west entrance point of Becher bay; Church point being the eastern one. The breadth of the entrance is a little over one mile, and off the eastern side are several small wooded islands, named Bedford islands. The depth of water at the entrance varies from 20 to 50 fathoms rocky and irregular bottom; at three-quarters of a mile within in a northerly direction are Wolfe and Frazer islands, with some small islets off them; between these two islands, which lie East and West from each other, Frazer being on the eastern side, is the channel 4 cables wide to the anchorage; it then takes a north-easterly direction for three-quarters of a mile, where anchorage in 10 fathoms water may be had, with the centre of Frazer island bearing S.S.W. distant one quarter of a mile.

Anchorage.—Becher bay cannot be recommended as a good anchorage; it affords no great shelter with southerly or westerly winds, and vessels outward bound had far better wait a fair wind in Parry bay, to the northward of Race islands.

DIRECTIONS.—Vessels bound up the strait, intending to go outside the Race islands, should pass the land about Beechey head at the distance of 2 miles.

Steamers intending to take the Race passage may pass Church point at the distance of about half a mile, and keep the land aboard about that distance until up with Bentinck island, when the latter should be closed and kept within one quarter of a mile, or just outside the kelp.

Caution.—The passage between Bentinck island and the Vancouver shore is choked with rocks, and strong tides set both inside and outside.

RACE ISLANDS, a cluster of low, bare rocks, the outermost of which lies one mile S.E. from Bentinck island, at the south-east point of Vancouver island, occupy more than half a mile in extent, north and

* *See* Admiralty plan of Becher and Pedder bays, No. 1,906; scale, $m = 4$ inches.

south, and the same east and west. Great Race, the outermost and largest, is 1½ cables in extent and 28 feet high; the others are smaller, a few feet above high water or awash. The tides among them run from 5 to 7 knots, and during bad weather, heavy and dangerous overfalls and tide races occur. Great Race should be given a berth of one mile and a quarter, at which distance depths of from 40 to 50 fathoms will be found.

Rosedale rock, with only a depth of 5 feet water on it, lies 4 cables S.E. by E. from the Great Race, and uneven ground of 5 to 8 fathoms extends half a mile eastward of the rock. In light winds a sailing vessel should give these islands a good berth, especially when eastward of them, as the ebb sets strongly towards them. In 1860 a large vessel was drifted on them by the ebb tide in a calm, and became a total loss.

LIGHT.—From a stone lighthouse, painted in alternate horizontal black and white bands, situated on Great Race rock, is exhibited, at an elevation of 118 feet above the mean level of the sea, a *flashing* white light, which shows a *flash* every *ten seconds*, and should be visible in clear weather from a distance of 18 miles.

Fog signal.—A steam-whistle on Great Race rock will be sounded at intervals of 72 *seconds* during thick or foggy weather; the duration of the blast being *five seconds*.

Tides.—It is high water, full and change, at Race islands at 3h. 0m.; rise 8 feet. The streams (in August) turn with high and low water by the shore.

RACE PASSAGE is 4 cables in breadth between the Race rocks and Bentinck island, and has a general depth of 14 fathoms, but with shoal heads of 8 and 6 fathoms, nearly in mid-channel. This passage may be taken by a steamer;* but under ordinary circumstances it is not recommended for a sailing vessel, on account of the strength of the tides, and races caused by the irregular rocky nature of the bottom. A case may arise, however, either inward or outward bound, when a vessel overtaken by a strong S.E. wind would do better to run through, than to risk weathering the Great Race by less than 1¼ miles; if so, the Bentinck island shore should be kept aboard at a distance of 2 cables, or just outside the kelp; for the northernmost rock, which forms the southern side of the passage, is covered at high water, and the strongest tides and eddies are found in its neighbourhood. The course through Race passage is N.N.E. and S.S.W.

Tide race.—Caution.—Heavy tide races occur along the north shore of Juan de Fuca strait from Esquimalt as far westward as Beechey head.†

* Race passage should not be used by vessels of heavy draught at low water.

† H.M.S. *Fawn*, when steaming at the rate of 6 knots, was turned round in these races.—H. Sugden, Navigating Lieutenant, R.N., 1874.

RACE ISLANDS to ESQUIMALT HARBOUR.—After rounding Race island lighthouse at the distance of one mile, the course for Esquimalt harbour is N. ½ W., distance 8½ miles. The lighthouse on Fisgard island, a white tower elevated 70 feet above the sea, at the western entrance point of the harbour, is very conspicuous, and will be seen immediately on rounding the Race islands; a course direct for it will clear all dangers, but attention must be paid to the set of the tides.

The ebb tide runs almost directly from the Haro and neighbouring straits towards the Race islands, and a sailing vessel, unless with a commanding wind, should give them a berth of more than one mile, and steer N.E. by N. for 3 or 4 miles, before bearing up for the harbour. The flood sets to the N.E., and with light winds vessels are liable to be carried to the eastward, and if near to the Vancouver island shore, they may be set up the Haro channel, where the water is generally too deep for anchorage; therefore, with the flood, the coast of Parry bay should be kept aboard if possible, where good anchorage may be had in moderate weather, and with all westerly winds, at less than one mile from the shore in 10 fathoms.

By night, when Fisgard island light bears N. by W., a vessel may steer boldly for it. The only precaution necessary is to keep the white light in full view; if it becomes dim or shaded, the shore is being too closely approached and the vessel should immediately haul out to the eastward until it is again distinctly seen; the two lights by their bearings will immediately show how the vessel is being affected by the tides.

Entering Esquimalt harbour, the Fisgard island light should be left from one to two cables on the port hand; when it bears N.W. by W. ½ W. the light changes from *white* to *red*, and shows the latter colour within the harbour; and when it bears S. by W. at a convenient distance, a vessel may anchor in 7 fathoms, or stand into Constance cove if preferred. The Scrogg rocks on the eastern side of the entrance of the harbour must be avoided; they lie nearly 4 cables E.S.E. from Fisgard island. If not desiring to enter the harbour at night, good anchorage may be had in Royal roads, in 9 fathoms, with Fisgard island light bearing N. by W. from half a mile to one mile distant.

The entrance to Victoria harbour being only 2 miles eastward from Esquimalt, the same precautions as regards the tides must be observed when making for that harbour. The course from one mile off the Race islands is N. ¾ E.; during daytime Victoria District church, a conspicuous white building with a spire, standing on an eminence, will be seen shortly after rounding these islands bearing N. by E. ¼ E.; it should be kept just on the starboard bow. At night or during bad weather it is strongly recommended not to run for this harbour, as it can only be entered at certain stages of the tide, and the anchorage outside is at such times exposed and

unsafe, while Royal bay, or Esquimalt harbour are always available and safe; but if it is decided to run for Victoria, it must be borne in mind that when Fisgard island light changes from *white* to *red*, a vessel will be very near the shore.*

BENTINCK ISLAND, lying close off the south-east point of Vancouver island, is little over half a mile in extent, and irregularly shaped, being almost divided in the centre by a narrow neck of land. It is about 100 feet high, and, like the adjacent land, covered with pine trees; its southern and eastern sides are fringed with kelp, outside which there are no dangers beyond those described in the Race channel. Between it and the mainland is a boat channel, and coasters acquainted with the locality find shelter at its eastern entrance; there are some settlers' houses in the neighbourhood.

Between Bentinck island and Esquimalt harbour, a distance of 8 miles, the coast is indented by several bays, and anchorage may be obtained in 8 to 10 fathoms anywhere within one mile of the shore, except immediately off William and Albert heads; the only dangers are a reef lying about one cable's length off Albert head, and Coghlan rock in Royal bay, lying 3½ cables N.N.W. from same head.

PEDDER BAY,† the first of these indentations, has its entrance immediately northward of Bentinck island, 2 miles N.N.W. of the Great Race rock, between cape Calver and William head, where its breadth is three-quarters of a mile; the inlet takes a W.N.W. direction for 2 miles, narrowing rapidly, and at half a mile up is only fit for small craft, which may find good shelter at its head.

Anchorage.—Vessels of any size may anchor in the entrance in 7 fathoms, with cape Calver, its southern point, bearing S.E. by S. distant about half a mile; but though the holding ground is good, it is open to all winds from N.N.E. round by east to S.S.E., and with a S.E. gale would neither be a desirable nor safe anchorage.

Tides.—The tides on the Vancouver island shore are very irregular in this locality. In Pedder bay (in October) the tide at high water was observed to fall about one foot and then to rise again. When the ebb stream had slackened in the offing, the tide rapidly fell in Pedder bay. The ebb stream coming round William head is diverted into Pedder bay and prevents the water from leaving it; Becher bay is subject to the same irregularities.

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* *See* Admiralty charts:—Haro and Rosario straits, No. 2,689; scale, $m = 0 \cdot 5$ inch and Haro strait and Middle channel, No. 2,840, scale, $m = 1$ inch.

† *See* Admiralty plan of Becher and Pedder bays, No. 1,906; scale, $m = 4$ inches.

The stream in the offing runs about 2 hours after high and low water by the shore. A south-west wind frequently prevents the water from falling at all.

PARRY BAY, immediately northward from William head, affords good anchorage with all westerly winds. Vessels bound to sea and meeting with a strong wind from this quarter are recommended to return here. With a south-east wind there is ample room to weigh, which a vessel should immediately do, and if not able to round the Race islands and proceed to sea, she should run for Esquimalt harbour.

Albert head, the north point of the bay, is moderately high, sloping to the sea, bare of trees at its extreme, but wooded immediately behind; a reef lies one cable off it. William head somewhat resembles it, but is lower. The water is too deep for anchorage immediately off these heads.

Coghlan rock, on which there is only a depth of 2 fathoms, but with deep water all around it, lies 3½ cables N.N.W. from Albert head; and 3¾ cables E.N.E. from the islet at the entrance of the lagoon to the northward.

Anchorage.—The anchorage is in 9 fathoms at from half to three-quarters of a mile off the sandy beach, with William head bearing S.E. by S. about the same distance.

ROYAL BAY or ROADS, of which Albert head is the southern point, and the entrance of Esquimalt harbour the northern limit, is a fine sheet of water 3 miles in extent, affording good anchorage with all winds which would prevent a vessel from entering that harbour.

Anchorage may be had anywhere within three-quarters of a mile from the western shore. A good berth is one mile south from Duntze head, with the entrance open, or the beacon on Dyke point just open of Inskip rocks (in the harbour); this latter is also the leading mark for clearing the Scrogg rocks when steering in or out.

FISGARD LIGHT.—From a white lighthouse situated on Fisgard island (a small rocky islet 25 feet high, and almost connected with the shore, forming the western entrance point of Esquimalt harbour), at an elevation of 70 feet above the mean level of the sea, is exhibited a *fixed* light which shows *white* when bearing from N. ¼ W. to N.W. by W. ½ W.; *red* from N.W. by W. ½ W. through west to S. ¾ E., and *white* from S. ¾ E. to S.E. ½ E.

The white light is intended to guide a vessel in from seaward, and while visible clears alike the western coast between Race island and Esquimalt, and the southern shore with its off-lying dangers, Scrogg rocks, and Brotchy ledge, between Duntze head and Trial island. The red

light will be found useful by vessels bound to Victoria or Esquimalt from the eastward; after rounding Trial island it will indicate a vessel's distance from the shore, and if bound to Esquimalt, a W.S.W. course will lead a safe distance outside Brotchy ledge, until the light changes from *red* to *white*, when it may be steered for, and not before; the light should be visible in clear weather from a distance of 10 miles.

ESQUIMALT HARBOUR* is a safe and excellent anchorage for ships of any size, and with the aid of the light on Fisgard island may be entered at all times with great facility. The entrance, which bears North 8½ miles from the lighthouse on Great Race island, is between Fisgard island and Duntze head, and is 3 cables in breadth, opening out immediately within to an extensive harbour having a general depth of 6 fathoms over it, and extending 1¼ miles to the north-west. On the east side are Constance cove† and Plumper bay, in the former of which, built on Duntze head, are the Government Naval establishments.

There is daily communication with Nanaimo by rail. The railway terminus is situated in Thetis cove, from which there is an extension to Victoria; and a short branch runs down to a pier, which has been built out from the south point of Thetis cove, near the indian village, into a depth of 15 feet at low water.

One cable's length above Dyke point (north point of Plumper bay) the water shoals to 3 fathoms, and from thence to the head of the harbour is a flat with only a few feet on it at low water.

Dock.—A dock 450 feet long, and 65 feet wide at the entrance, with a depth of 26½ feet over the sill at high water ordinary spring tides, has been constructed west of Thetis island, and was opened on the 23rd July 1887, H.M.S. *Cormorant* being the first vessel to enter it. This dock is closed by a caisson which, if necessary, can be placed on the outer side of the outer invert, giving an additional length to the dock of 30 feet.

Tides.—It is high water full and change in Esquimalt harbour at from mid-night to 3 a.m. from May to October, and during the remaining months from noon to 3 p.m.; springs rise 7 to 10 feet, neaps 5 to 8 feet.

Winds.—The strongest and most frequent gales blow from S.W. and S.E., which are leading winds in, but rarely from N.W. The S.W. is a summer wind, generally fresh, and brings fine weather, unless it blows a gale. S.E. winds may be looked for during the winter months, or between, November and March, and generally a strong gale once a month with rain and thick weather. The N.E. wind rarely blows with much strength,

* *See* Admiralty plan of Esquimalt and Victoria harbours, No. 576; scale, $m = 6$ inches; also Admiralty plan:—Esquimalt harbour, No. 1897[a]; scale, $m = 10$ inches.

† *See* Admiralty plan:—Constance cove, No. 572; scale, $m = 18$ inches.

and always brings fine clear weather; a direct South wind, to which some parts of the harbour are open, seldom blows, and there is never sufficient swell to render the anchorage inconvenient.

Supplies, with the exception of fresh beef and bread must be obtained from Victoria.

Coal.—Independent of the supply kept at the naval establishment on Thetis island a stock of 5,000 tons of coal is maintained at Esquimalt. Vessels of about 15 feet draught can coal alongside Thetis island wharf; regard should, however, be paid to the 15 feet shoal, which lies 60 yards from the high water mark of the island, in the direction of the pier. Vessels can also coal alongside a wharf; on the east side of which there is a depth of 25 feet at low water. Or coal can be taken on board at all times from colliers or boats alongside.

Water may be obtained during the winter months without difficulty from the many streams that flow into the different bays; but in summer, watering is a tedious process, and boats must be sent either to Rowe stream, at the head of the harbour, or to the salt lagoon just outside the entrance. Both offer difficulties, unless at or near high water.

Electric telegraph.—*See* pp. 3, 25–42, 95.

Population.—The population of Esquimalt in 1881 was 614.

Beacon.—A white pyramidal wooden beacon, 23 feet above high water, is erected on Dyke point (at the head of the harbour).

Scrogg rocks, the only dangers, lie on the eastern side of the entrance 3 cables S.S.E. from Duntze head, and cover at three-quarters flood. Inskip islands kept well open of the head leads clear to the westward of them; but the best mark for entering with a leading wind is the beacon on Dyke point, just open of the rocks off the western end of Inskip islands, bearing N. by W. ¼ W., which leads in mid-channel.

Fisgard island should not be passed within less than one cable's length keeping just outside the kelp, which extends about half a cable eastward from it, as a rock with only 7 feet water over it lies three-quarters of a cable north-east from the lighthouse.

Buoy.—The shoal, with only 4 feet on it at low water, lying south of Village rocks, is marked by a red nun buoy. This shoal was formerly the foundation of the T head of Foster's pier, which has fallen into decay, there being now only a portion of the pier standing.

Whale rock, with only 7 feet on it at low water, lies 2 cables W. ½ N. from the outer Inskip island, or nearly midway between it and the western shore of the harbour. This rock is of small extent, and not marked by kelp; it has a clear passage on either side, that to the eastward being

the wider. Yew and Rodd points, just touching, point to the rock ; Yew point, just touching the lighthouse on Fisgard island, bearing S. by E. ¾ E., leads nearly one cable's length westward ; and when Ashe head is well shut in by Inskip islands, a vessel will be clear to the northward. The rock is marked by a buoy coloured red and black in vertical stripes, moored off its south side.

Anchorage.—The most convenient anchorage is in Constance cove,* on the eastern side of the harbour, immediately round Duntze head, the general depth being 6 fathoms, and the holding ground good ; vessels of war anchoring between Dockyard jetty and Foster's pier, or Village rocks. There is, however, safe anchorage in any part of the harbour, in not less than 4½ fathoms, as far northward as Dyke point.

Thetis cove, in Plumper bay, on the eastern side of the harbour, immediately north of Constance cove, is a snug anchorage in 4½ fathoms, with the harbour entrance just shut in by Inskip rocks; but vessels proceeding above these rocks must take care to avoid the Whale rock.

Observation spot.—Duntze head flagstaff is in lat. 48° 25′ 49″ N. long. 123° 26′ 45″ W.

Directions.—Vessels entering the harbour at night with a strong wind after them, should take care to shorten sail in time, as the space for rounding to is somewhat limited ; and it is desirable to moor if any stay is intended, as the winds are changeable.

The best time for sailing vessels to leave the harbour is early in the morning, when either a calm or light land wind may be expected ; there is little strength of tide in the harbour, or for some distance outside, and it sets fairly in and out.

VICTORIA HARBOUR,† a little more than 2 miles eastward from Esquimalt, has its entrance between Ogden and MacLaughlin points. Macaulay point, a remarkable projection nearly midway between the two harbours, is a bare flat point about 30 feet high, showing as a yellow clay cliff, worn by the action of the sea and weather into a rounded knob at the extreme. The coast for one mile on either side of this point is fringed with sunken rocks, and is dangerous for boats in bad weather, many fatal accidents having occurred.

The entrance to the harbour is shoal, narrow, and intricate, and with S.W. or S.E. gales a heavy rolling swell sets on the coast, which renders the anchorage outside unsafe, while vessels of burthen cannot run in for shelter unless at or near high water. Vessels drawing 14 or 15 feet water

* *See* Admiralty plan :—Constance cove, No. 572 ; *scale*, m = 18 inches.

† *See* Admiralty plan :—Esquimalt and Victoria harbours, No. 576 ; scale, m = 6 inches ; also Victoria harbour 1897[b] ; scale, m = 10 inches.

may, under ordinary circumstances, enter at such times of tide ; and ships drawing 17 feet have entered, though only at the top of spring tides.

Doubtless Victoria harbour is susceptible of improvement by artificial means, though it is improbable that it can be made a safe and convenient port of entry for vessels of even moderate tonnage, at all times of tide and weather.

Victoria was selected by the Hudson's Bay Company as the depôt of their establishments in consequence of the quantity of clear good land in the immediate neighbourhood, and the harbour being sufficiently spacious for the few small vessels in their employ, in these respects it was well chosen.

Victoria, the seat of the government, is the largest and most important town in British Columbia, and enjoys a considerable foreign and coasting trade, which is annually increasing. The resident population according to the census taken in 1881 was 6,687 exclusive of Indians, but is now said to be nearly 12,000, and the town has made great progress since 1858, when it may be said to have first sprung into existence ; it now covers a large extent of ground, substantial and handsome stone and brick buildings everywhere replacing the wooden structures first erected. Victoria has excellent educational institutions, hospitals, and library, and the streets are lighted by the electric light.*

Harbour and pilot dues are charged ; and there are sick mariners dues of 2 cents a ton register three times a year on vessels of 100 tons and upwards, and once a year on vessels under 100 tons. There is a quarantine station for persons affected with infectious diseases ; and a hospital for seamen who are recommended for admission by masters of vessels that have paid sick mariners dues.

At the entrance of the harbour, on the south side of Shoal point, there is a wharf which is used by the San Francisco steamers. The pier is 600 feet in length and has a depth of 23 at low water. Along the eastern side of the harbour in front of the town there are about 400 yards of fair wharfage, with a depth of from 10 to 16 feet at low water spring tides. Between Songhies and Limit points on the opposite side of the harbour is a small slip capable of receiving vessels of about 200 tons burthen ; larger vessels, however, may heave down alongside the wharves.

During the year 1886 615 vessels visited the port of Victoria of an aggregate tonnage of 369,628 tons : and the value of the exports for the year 1884 amounted to $1,787,105, and of the imports to $2,934,130.

A submarine telegraph cable crosses the strait of Georgia at Nanaimo and connects the city with the mainland of British Columbia, and another crosses Juan de Fuca strait to Washington territory.

There is direct mail communication with San Francisco every week, a tri-weekly service to the east coast of Vancouver island, and a daily

* Instances have been known of shocks of earthquakes being felt at Victoria.

service to port Moody, except on Mondays; and steamers run daily, except on Sundays, to the ports in Puget sound. There is daily communication with Nanaimo by rail.

Buoys.—The channel is marked by black buoys with odd numbers on the northern side, and red buoys with even numbers on the southern side.

The buoys marking the northern edge of the shoal extending from Shoal point, as also Channel rock (lying half a cable south-west of Pelly island) are of pyramidal shape, surmounted by a ball.*

Supplies.—Provisions of all kinds, and of an excellent quality, may be procured, and water is to be had from a floating tank capable of going outside the harbour. Supplies for refitting and repairing vessels, except timber, are scarce and expensive, but of fair quality. Ordinary repairs to machinery of steamers can be effected.

Coals can be obtained at the price $6 per ton, but a large quantity is not kept in store. Vessels can coal alongside the wharves in the harbour, and also from the wharf on the south side of Shoal point.

Patent slip.—There is a slip ("Cook's Ways") on which vessels of moderate size can be hauled up.†

Anchorage.—Vessels anchoring outside the harbour to wait for the tide, or from other causes, should not come within a line between Ogden and MacLaughlin points, the former bearing E. ½ S., the latter W. ½ N., midway between, or one quarter of a mile from either; this is a good stopping place with off-shore winds or fine weather, but is by no means recommended as a safe anchorage for sailing vessels during the winter months, when bad weather may be looked for with little warning.

Pilots.—There are pilots attached to the port, who keep a good look out for vessels off the entrance. Pilotage is compulsory to all merchant vessels, except coasters.‡

Brotchy ledge.—About 4 cables from Holland point, and right in the fairway of vessels entering Victoria harbour from the eastward, lies the Brotchy ledge with only 5 feet water on its shoalest part; it is covered with kelp, and is about one cable in extent within the 5-fathom line. There are 9 fathoms water between the ledge and the shore.

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* The buoy formerly marking the position of Sleeper rock has been removed.

† H.M. gun-vessel *Rocket* was hauled up on it in 1882.

‡ Pilots are seldom met with below the Race rocks; but between January and July, in moderate weather, vessels approaching the straits of Juan de Fuca and requiring a pilot, may obtain a man competent to take them to Royal roads or port Townshend from the schooners engaged in the seal fishery off the coast, between cape Beale and Clayoquot sound, at a distance of from 5 to 20 miles from the land. Sometimes in Neeah bay a pilot may be had if a gun is fired twice in quick succession. Guns are used by the sealing schooners in foggy weather, but only once in 10 or 15 minutes, so that a gun fired twice in quick succession would not be mistaken.

Buoy.—This shoal is marked by a pyramidal buoy, coloured red and black in horizontal stripes, and surmounted by a cage, moored 1½ cables S.W. from the shoal of 5 feet. The buoy is occasionally washed away during the heavy winter gales.

Fisgard island lighthouse, north part of Brothers island, and Macaulay point in line bearing W. ¾ N., leads one cable north of the ledge in 9 fathoms, between it and the shore; and Fisgard island lighthouse, just open southward of Brothers island bearing W. by N. ¼ N., leads 2 cables south of the ledge in 21 fathoms water.

LIGHT.—From a white wooden lighthouse 30 feet high, situated on Berens island (west side of Victoria harbour), is exhibited, at an elevation of 44 feet above the sea, a *fixed blue* light, which should be visible in clear weather from a distance of 6 miles.

Fog signal.—A fog bell is rung during foggy weather, whenever vessels indicate by their whistles that they are approaching the harbour.

Directions.—The channel is buoyed (*see* p. 41), but it is necessary for a stranger to take a pilot, and the space is so confined and tortuous that a long ship has considerable difficulty in making the necessary turn; a large per-centage of vessels entering the port, small as well as large, constantly run aground from these causes, or from trying to enter at an improper time of tide, or neglecting to take a pilot. Such accidents, however, are seldom attended with more than delay and inconvenience, as the shoalest and most intricate part of the passage is sheltered; when within, the port is perfectly land-locked, and vessels may lie in from 14 to 18 feet at low water, but the harbour accommodation is limited.

Tides.—It is high water at full and change in Victoria harbour at from midnight to 3 a.m. from May to October, and during the remaining months at from noon to 3 p.m.; springs rise 7 to 10 feet; neaps rise 5 to 8 feet.*

The COAST from Victoria harbour trends in an easterly direction for 2 miles to Clover point, and is for the most part faced by white sandy cliffs, varying in height from 10 to 80 feet; a sandy beach extends along the whole way, and at one cable's distance off in many places are rocks and foul ground. Two cables east from Holland point, and one cable off shore, are the Glimpse reefs, which cover at three-quarters flood, and have a depth of 7 fathoms just outside them.

Beacon hill, a gentle rise of the land, 2 cables from the water's edge and one mile east from the harbour, is 140 feet high, grassy, and bare of trees.

Clover point, at 2 miles eastward from the entrance to Victoria harbour, is low, bare of trees, and projecting; it is steep-to, and off it strong

* On 14th November 1871 there was an unusually high tide, almost submerging some of the wharves.

tide rips form, which are dangerous to boats in heavy weather. Ross bay to the eastward of it is open, but sometimes used by small craft if waiting for the tide, there being depths of 4 to 5 fathoms at 2 cables' distance off shore

Telegraph.—The submarine telegraph cable connecting Vancouver island with the United States is laid from Clover point to New Dungeness, *see* p. 25.

Foul bay, nearly one mile north-east from Clover point, is of small extent and filled with rocks. Off its entrance are the Templar rocks, with a depth of about 4 feet on them; they are marked by kelp.

Foul point, on the east side of Foul bay, is rocky; but there is not less depth than 4 fathoms at one cable's distance. The land at the back of the point rises to a height of 230 feet, forming a rocky ridge or summit, known as Gonzales hill.

TRIAL ISLANDS, nearly $1\frac{3}{4}$ miles eastward from Clover point on the south side of Enterprise channel, are two in number, bare and rocky, but they generally appear as one. The south or largest island is 80 feet high, and steep-to at its outer end; the northern one is low, and from it foul ground extends some distance. Strong tide ripples prevail off the southern island especially during the flood, which runs nearly 6 knots at springs just outside it.

INNER CHANNELS.*—The inner channels leading from Juan de Fuca strait into the Haro strait are the Enterprise, Mouatt, Mayor, and Baynes channels, and Hecate and Plumper passages.

Enterprise channel, between Trial islands and the Vancouver shore, is a narrow, tortuous, but deep channel, much used by steamers and coasters trading to Victoria harbour, as a slight saving of distance is effected, and less tide experienced than by going south of the Trial islands; it is about one mile long, and half a cable wide, in the narrowest place, and there are not less than 24 feet water in the shoalest part.

McNeil bay, on the north side of the channel, to the eastward of Foul point, is upwards of 3 cables in extent, with from 2 to 6 fathoms water; it is open to the southward, and foul ground exists in its east part, but the bay is much used by small vessels waiting for the tide.

Mouatt reef, in the eastern part of the channel, 3 cables N.E. by N. from north Trial island and nearly 2 cables' lengths off shore, is about one cable in extent, and covers at one quarter flood; this reef is dangerous for vessels using the Enterprise channel, as it lies just north of the fairway.

McNeil farm, just open west of Kitty islet, a bare yellow rock 4 feet high on the east side of McNeil bay, bearing W. $\frac{1}{2}$ N., leads half

* *See* Admiralty chart:—Inner channels, No. 577; scale, *m* = 6 inches.

a cable south of Mouatt reef; and Channel point in line with the west side of the Great Chain islet bearing N. by E. ¼ E., leads nearly 2 cables east of it.

Directions.—Bound through the Enterprise channel to the eastward, when past Foul bay, give Foul point a berth of 2 or 3 cables, and steer for the west side of McNeil bay on a northerly course; approach it close to, after which steer direct for Kitty islet, and when within half a cable's length of the latter, haul quickly to the eastward, keeping McNeil farm just open west of Kitty islet, bearing W. ⅛ N.; this will lead safely through the narrowest part of the channel and south of Mouatt reef. When Channel point and the west side of Great Chain islet come in line bearing N. by E. ¼ E. the vessel will be well east of the reef, and should alter course to the northward to avoid the Brodie rock, proceeding up through any of the inner channels.

Brodie rock, a patch of 3 fathoms least water, marked by kelp, lies nearly one mile N.E. ¼ N. from the summit of the south Trial island, and 6 cables E. ½ S. from Mouatt reef.

The north point of small Trial island in line with Foul point bearing W.S.W. leads 1⅓ cables' lengths north of Brodie rock.

Foul point seen between the Trial islands bearing W. ⅔ S. leads 2½ cables' lengths south of the rock.

Cadboro point in line with the east extreme of Great Chain island bearing N. by W. leads 2½ cables' lengths to the eastward of the rock.

Gonzales point forms the south-east extremity of Vancouver island. It is a low salient point, rocky, bare of trees, and steep-to on the east side.

Oak bay.—From Gonzales point, the Vancouver shore trends to the northward, and at one mile from the point forms a sandy bay which is somewhat less than one mile in extent, and affords fair anchorage near its north part in from 3 to 4 fathoms.

The best anchorage is to the northward of Mary Todd islet in the south part of the bay. This islet is bare, and about 30 feet high; at 2 cables east from it, is Emily islet, 4 feet above high water, and the same distance south from Emily islet, lies the Robson reef, which uncovers at low water.

Cadboro bay, 2½ miles to the northward from Gonzales point, is about half a mile in extent, and open to the south-east; no sea, however, rises within it, and there is good anchorage in from 3 to 4 fathoms water near the entrance.

The Vancouver shore from Gonzales point to this bay is low and lightly timbered with dwarf oak and pine trees; to the northward of Oak bay it is clear of danger at one cable's distance.

Thames shoal, on which is a depth of 2 fathoms, is of small extent, and marked by kelp; it lies nearly half a mile N. by E. ¾ E. from Gonzales point, at the south-west part of the Mayor channel. Channel point in line with the west side of Great Chain islet bearing N. by E. ¼ E., leads one cable east of this shoal; and the highest part of Trial island in line with Gonzales point bearing S. ¾ W. leads half a cable west of it.

Mayor channel, to the northward of Gonzales point, and west of Chain islets, is about 2 miles long in a winding direction to the northward, its breadth in the narrowest part is 3 cables, and the depths in it vary from 9 to 13 fathoms. The channel is bounded on the west side by Thames shoal, Harris island, and Fiddle reef, and abreast the latter on its opposite side lies the Lewis reef. The tide seldom runs more than 3 knots through this channel, and it is the one generally used.

Mouatt channel. — Lee rock, which only uncovers at low water spring tides, lies 1½ cables W.N.W., from Thames shoal; it is marked by kelp and steep-to on the east side. Between this rock and Thames shoal is Mouatt channel, one cable wide with depths from 7 to 9 fathoms.

The highest part of Trial island in line with Gonzales point, bearing S. ¾ W., leads midway between Thames shoal and Lee rock; also through the fairway of the north part of Mayor channel between Fiddle and Lewis reefs.

Fiddle reef, at the north-west extreme of Mayor channel, and upwards of one mile from Gonzales point, is of small extent, and awash at high water spring tides; it may be approached close to on the east side.

Beacon.—A beacon, consisting of a white conical structure 41 feet high, surmounted by a black pole and cage 10 feet high, has been erected on Fiddle reef.

Todd rock, at 1½ cables W.N.W., from Fiddle reef, in the entrance to Oak bay, covers at two-thirds flood, and is marked by kelp.

Lewis reef, at the north-east part of Mayor channel, lies 2½ cables S.E. by E., from Fiddle reef, and 2¾ cables N.W., from Great Chain islet, covers at high water, and may be approached close to on the west side.

The passage between it and Chain islets is filled with kelp, but has not less than 2 fathoms water.

A beacon, consisting of a round stone tower, coloured *black* 10 feet in height, surmounted by a cross, 16 feet above high water is situated on Lewis reef.

Chain islets, midway between Discovery island and the Vancouver shore, are a bare rocky group, two-thirds of a mile long in a westerly direction, and half a mile wide. The largest, called Great Chain islet, is about one cable in extent and 30 feet above high water; it lies at

the south-west side of the group, and its south part may be approached to one cable's distance.

Spencer ledge, off their east side at a distance of 1½ cables from the easternmost high-water rock, is marked by kelp, and has 9 feet water on its shoalest part; if going through Hecate passage it requires to be guarded against. Cadboro point, open west of Channel point bearing N.N.W. ⅜ W., leads one cable east of this ledge through Hecate passage.

Caroline reef, at the north part of the group, and connected to it by a rocky ledge, is of small extent, and covers at one quarter flood, but is well out of the track of vessels using any of the channels. Foul ground with depths of from 3 to 4 fathoms, and marked by kelp, extends upwards of one cable west from it.

DISCOVERY ISLAND is 2 miles north-east from Gonzales point, at the junction of the Haro and Fuca straits. It is wooded, about three-quarters of a mile in extent, and its shores on all sides are bordered by rocks, extending in some places more than 2 cables off. Rudlin bay, on its south-east side, is filled with rocks, and should not be used by any vessel.

LIGHT.—From a white wooden lighthouse 47 feet high, situated on the east extreme of Discovery island, is exhibited, at an elevation of 91 feet above high water, a *fixed* white light, visible between the bearings of N.N.E. ¾ E., through west, and S.E. ¼ S. (thus showing over an arc embracing Haro strait and Sidney channel, and the direction of Race islands). The light should be visible in clear weather from a distance of 15 miles.

CHATHAM ISLANDS, to the north-west of Discovery island, and separated from it by a narrow boat pass, are of small extent, forming an irregular group, low, wooded, and almost connected with each other at low water, the tide sets with great strength through the passages between them; their west side is steep-to.

Leading point, at the south extreme of Chatham islands, is a bare rocky islet at high water; to the eastward of it is a small boat cove Channel point, their west extreme, is also bare and steep-to; the tide sets strongly past it.

Strong Tide islet, the north-west of Chatham islands, is rocky, about 50 feet high, and wooded; its west side forms the eastern boundary of Baynes channel, and is steep-to; the ebb tide sets very strongly past it, nearly 6 knots at springs.

Refuge cove, on the east side of Chatham islands, is small, and has a depth of 1½ fathoms in the centre; coasters or small craft entangled among these islets may find shelter in it. Alpha islet, the easternmost of the group, is bare, and 10 feet above high water; it is steep-to on the east side, but only a boat should attempt to go westward, or inside it.

Fulford reef, 3 cables north from the Chatham islands, is about one cable in extent, and covers at one-third flood. Vessels using the Baynes channel should keep well to the westward to avoid this reef, as the tide sets irregularly in its vicinity.

HECATE and PLUMPER PASSAGES.—Discovery island is separated from the Chain islets by a passage half a mile wide in the narrowest part, forming an apparently clear and wide channel; but near the middle of the south part lies Centre rock, which has only a depth of 3 feet over it, and though marked by kelp, this, from the strength of the tides, is often run under, and seldom seen. There is a deep passage on either side of this danger, the one to the westward being called Hecate, and that to the eastward, Plumper passage; the latter is wider and best adapted for large steamers, but the tide sets very strongly through both of them.

Leading marks.—Cadboro point, open west of Channel point bearing N.N.W. $\frac{3}{4}$ W., leads through Hecate passage in mid-channel, west of Centre rock.

Cadboro point, well shut in north of Leading point bearing N.W. $\frac{1}{2}$ N., leads through Plumper passage in mid-channel, east of Centre rock.

Baynes channel, between Cadboro point and the Chatham islands, connecting these inner channels with Haro strait, is upwards of one mile long and half a mile wide; the depths in it are irregular, varying from $2\frac{3}{4}$ to 30 fathoms, and the tide at springs sets through it with a velocity of 4 to 6 knots, strongest along the eastern side.

Five-fathom shoal, which lies in the centre of the channel, is not marked by kelp. Nearly one cable N.W. from it is another shoal with only $16\frac{1}{2}$ feet water on it, and extending about 83 yards north and south and 50 yards east and west; it lies $4\frac{1}{4}$ cables N.W. $\frac{3}{4}$ N. from Channel point, and $3\frac{3}{4}$ cables E.N.E. from Jemmy Jones islet. To avoid it a vessel should keep a little over on either side of mid-channel.

CADBORO POINT, on the Vancouver shore, at the termination of the inner channels, is nearly 3 miles north from Gonzales point, and three-quarters of a mile N.W., from the Chatham islands. It is about 50 feet high, rocky and bare of trees. A small islet lies just off it, also a reef which covers; when passing do not approach the islet within 2 cables.

The coast west from Cadboro point to Cadboro bay is low, very much broken, and there are some off-lying rocks.

Jemmy Jones islet, which is bare and 15 feet above high water, lies 3 cables off shore, and $4\frac{1}{2}$ cables S. by W. from Cadboro point; foul ground extends around it for upwards of one cable in some parts, and though there is deep water between it and the shore, none except small craft should go through that passage.

DIRECTIONS. — Though these inner channels are deep, they should not be used except by steamers of moderate size or by small craft, unless in cases of necessity, and a knowledge of the tide is indispensable. Coasters and small steamers, when taking advantage of them, generally proceed through the Mayor channel. If using this channel, after passing Gonzales point keep the west side of Great Chain islet in line with Channel point bearing N. by E. ¼ E. till within 2 cables of the islet, when the north end of Mary Todd island will be in line with the north point of Harris island and the vessel will be clear of the Thames shoal, after which steer to the north-west, bringing the highest part of Trial island in line with Gonzales point bearing S. ¾ W., and with that mark on astern, steer N. ¾ E., which will lead between the Fiddle and Lewis reefs, and on through Baynes channel, to Haro strait, taking care, however, to avoid the patch of 16½ feet lying close to the Five-fathom shoal, as this mark leads only half a cable's length westward of the patch. When past Lewis and Fiddle reefs, a vessel may steer N.N.E., and pass out of Baynes channel between Five-fathom shoal and Strong Tide islet, but the tides are much stronger this side of the channel.

Going through Mouatt channel, which is very narrow and seldom used, after rounding Gonzales point at one cable's distance, bring the highest part of Trial island in line with the point bearing S. ¾ W., and keeping this mark on astern, and steering N. ¾ E., will lead through clear of danger.

The Hecate and Plumper passages are nearly straight, and better adapted for large steamers than those west of the Chain islets. If using either of them, after passing either through Enterprise channel, or southward of Trial islands, bring the leading marks (page 47) on, and keep them so till northward of the Centre rock, when steer up in mid-channel between Chain islets and Chatham islands, N.W. by W., towards Cadboro bay, and through Baynes channel into Haro strait.

Tides.—The high water at full and change is irregular and much influenced by prevailing winds; the greatest rise and fall of tide at Discovery island is 12 feet. During summer months in these channels, the flood stream commences at 11.15 a.m., running with great strength till nearly 3 p.m., after which but little tide is felt till 4 a.m. on the following day, when the ebb commences and runs strong till nearly 11 a.m., the time of low water by the shore.

CONSTANCE BANK, lying in the Fuca strait, nearly 6 miles S.E. by. E. ½ E. from Fisgard island lighthouse, 3 miles S. by W. from Trial island, and 7 miles N.E. from Race island lighthouse, is upwards of one mile in extent with depths of from 9 to 14 fathoms, but a vessel should not anchor on it, as the bottom is rocky.

FONTÉ BANK, within the depths of 10 fathoms, is about 1½ miles in extent; it has depths of from 3½ to 5 fathoms on it and is marked by kelp. It lies nearly in the middle of Fuca strait, 6¾ miles S. ½ W. from Cattle point (San Juan island), 8 miles E. by S. from Discovery island, and 8 miles W. ½ S. from Smith or Blunt island lighthouse. This bank should be avoided, as there may be less water on it than shown in the chart.

HARO STRAIT,* the westernmost of the three channels leading from Fuca strait into the strait of Georgia, is bounded on the western side by Vancouver island, and its off-lying smaller islands and reefs, and on the eastern side by the islands of San Juan and Stuart, and trends in a N.W. by N. direction for 18 miles; it then turns sharply to the N.E. round Turn point of Stuart island, for a farther distance of 12 miles, leaving Saturna island to the westward, and Waldron and Patos islands to the eastward, when it enters the strait of Georgia between Saturna and Patos islands.

It is for the most part a broad, and for its whole extent a deep navigable ship channel; but on account of the reefs which exist in certain parts, the general absence of steady winds, the scarcity of anchorages, and, above all, the strength and varying direction of the tides, much care and vigilance is necessary in its navigation, and it is far more adapted to steam than to sailing vessels.

Besides the main channel of the Haro strait thus described, there are several smaller channels and passages branching from it by which vessels may enter the strait of Georgia; thus the Swanson channel leads into the strait by Active pass,† and the Trincomalie and Stuart channels by the Portier pass, or the Dodd narrows.

These channels may be again entered by smaller ones; thus Sidney and Cordova channels, on the western side of Haro strait, lead by Moresby, Colbourne, and Shute passages into the Swanson, Satellite, and Stuart channels, and finally into the strait of Georgia. These channels are essentially adapted to steam navigation, or to coasting vessels; they afford smooth water, and many of them anchorages. *See* pp. 64, 65.

Middle bank, lying in the southern entrance of Haro strait, 4 miles E. by N. from Discovery island, and almost in mid-channel, is a rocky patch about 2 miles in extent each way, and the least water found on it is 10 fathoms. In bad weather there are heavy tide ripplings on and in the vicinity of this bank, which are dangerous to boats or small craft.

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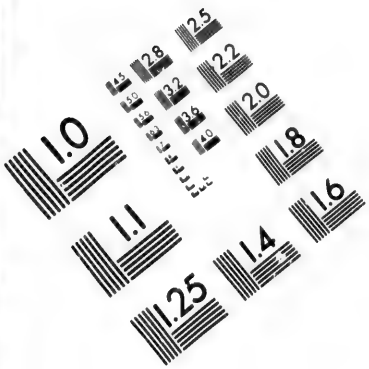
* *See* Admiralty chart:— Haro strait and Middle channel, No. 2,840; scale, $m = 1{\cdot}0$ inch.

† Formerly Plumper pass, by which name it was more generally known.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Zero rock, one of the principal dangers in the southern part of Haro strait, lies on the west side of the strait, is about half a cable in extent, covers at three-quarters flood, and its vicinity is marked by kelp; it lies 6½ miles N.W. from the east point of Discovery island, and 3½ miles E. by S. from the high white cliff of Cowitchin head.

Beacon.—A whitewashed beacon, pyramidal in shape, 30 feet high, surmounted by a pole and frame resembling an obelisk 20 feet high, also coloured white, has been erected on Zero rock.

A rocky patch, part of which nearly uncovers at low water springs, lies 3½ cables N.N.W. ½ W., from Zero rock.

Discovery island light is obscured in the direction of Zero rock, and westward of it.

The Kelp reefs, three-quarters of a mile in extent, lie almost in the centre of Haro strait, 7 miles N.N.W. ¼ W. from the east point of Discovery island, 5 miles E. by N. from Cowitchin head, and 2 miles E. by S. from the south end of Darcy island. They uncover at low springs, and are well marked by kelp, which extends in detached patches to Darcy island.

A black conical iron buoy* is moored in 6 fathoms water off the eastern-most patch of the Kelp reefs.

The Unit rock lies three-quarters of a mile E. by N. ½ N. from the south-east point of Darcy island, and uncovers 2 feet at low tides.

Bare island well open north of the south-east point of Sidney island, bearing N.W. ¼ W. leads one-quarter of a mile east of Kelp reefs and Unit rock.

DIRECTIONS.—Vessels passing up Haro strait to avoid the above dangers, after rounding Discovery island at the distance of one mile, should steer N.N.W., or for Kellett bluff of Henry island, a remarkable steep rocky headland. This course will clear to the eastward of Kelp reefs by one mile. In working up, when standing westward, a vessel should tack when the north-west extreme of Low island comes in line with the south-east point of Sidney island, which will give the Zero rock a good berth; but when approaching the Kelp reefs, Bare island must be kept well open to the eastward of the same point to avoid them. The eastern or San Juan shore is steep close to.

When abreast Kellett bluff, at from half a mile to one mile distant, a N.W. by N. course will pass the same distance from Turn point of Stuart island. There are no dangers off this point; but whirling eddies and tide ripplings, caused by the meetings of the streams from so many channels, are generally met with, particularly on the ebb. A vessel may reach this point with a fresh southerly wind, but will almost invariably lose it here, until having opened out the middle channel eastward of San Juan.

* This buoy is liable to drift out of position owing to the strong tides.

After rounding Turn point, a N.E. ½ N. course for 10 miles will lead to the northern entrance of Haro strait, between the East point of Saturna and Patos islands. This passage is 2½ miles in breadth, but is subject to heavy tide ripplings and eddies; vessels when possible should pass through the centre of it, steering for the white cliffs of point Roberts (Orcas Nob well open east of Waldron island bearing S.S.E. ¼ E. leads through mid-channel), and should not bear away to the westward until the south end of Sucia is shut in with south end of Patos island. At night, after passing between Saturna and Patos islands they should maintain a northerly course for about 2 or 3 miles, and then if the light on Georgina point, at the entrance to Active pass, is not visible, steer to the W.N.W. until it is sighted; remembering that this light becomes obscured when it bears to the westward of W. ½ S., and as whilst it is in view all dangers on the southern shores of the strait will be avoided, they should be careful to keep it in sight and by no means stand to the southward of the above line of bearing.

The flood from the Rosario strait, which is met with as soon as the passage between Orcas and Sucia islands is open, is apt to set a vessel towards the East point of Saturna,* off which and Tumbo island there is much uneven and broken ground with heavy tide races. This point should be given a berth of 1½ miles; taking care to avoid a dangerous rock lying 7½ cables N.N.E from Race point, Tumbo island. *See* p. 129.

The ebb sets to the eastward even before the strait of Georgia is well open, and a vessel finding herself not likely to weather Patos should pass between it and Sucia, where there is a good clear passage of above one mile in breadth; if this passage is taken, the Patos island shore should be kept rather aboard. Beware of the Plumper and Clements reefs; the former lies 1½ miles S.W. by S. from the north-west bluff of Sucia island, and has 10 feet water on it; the latter the same distance N.E. ½ N. from the same bluff, and has 9 feet water over it.

When in the strait of Georgia, from W. by N. to W.N.W. is a fair mid-channel course. If bound for Fraser river, a N.W. by W. course from the centre of the channel between Patos island and East point of Saturna, will lead to the Sand heads, a distance of nearly 20 miles. Entering the strait and having passed to the northward of Patos island, if the ebb is running a vessel is extremely liable, unless with a commanding breeze, to be set to the eastward and down the Rosario channel.

The northern shore of Sucia island should by all means be avoided; if Alden bank can be reached it offers a good anchorage while waiting for a tide. Alden point, the west point of Patos island, in line with Monarch head, a bold cliffy bluff, bearing S.W. ½ W., leads over the

* A *revolving white light* attaining its greatest brilliancy every 30 *seconds*, visible between the bearings of N.E. ½ N., through west, and S.E. by E. ¼ E., is exhibited from East point, Saturna island; the light is elevated 140 feet above the sea, and should be visible in clear weather from a distance of 18 miles. The lighthouse, painted white with a red lantern, is square in shape.

northern edge of this bank in from 6 to 9 fathoms.* When Mount Constitution is in line with the centre of Matia island, bearing S.S.E. $\frac{1}{3}$ E., 9 fathoms water may be expected, and a ship should not anchor in much less than this depth, as in the shoaler parts, rocky ground is found; the least water on the bank is $2\frac{1}{4}$ fathoms.

With a foul wind and ebb tide a vessel should always work up on the northern shore; there are no dangers, little tide when eastward of a line between Roberts point and Alden bank, and anchorage may always be had within one mile of the shore if necessary. Birch and Semiahmoo bays offer good anchorage, and are easy of access. In working up the strait of Georgia the southern shore should never be approached within two miles until westward of Active pass, and then not within one mile; the tides sweep strongly along this shore, and there are several outlying reefs between East point and Active pass.

As soon as the strait is entered from the southward, Roberts point will show its eastern part as a bold white-faced cliff, its western as a low shingle point; its summit is covered with trees, and it would at first sight be taken for an island in consequence of the land on its northern side falling rapidly in elevation. After passing northward of this point, its low-water extreme, or the trees just within it, must not be brought to bear southward of E. $\frac{1}{2}$ S. to avoid Roberts bank, which extends 5 miles off the Fraser river entrance, is steep-to, and shoals suddenly from 25 to 2 fathoms.

CORMORANT BAY, between Gordon and Cowitchin heads, on the western side of Haro strait, is a good stopping-place and easy of access under most circumstances. It may be entered either to the southward or northward of Zero rock; the passage to the southward is $1\frac{1}{2}$ miles in breadth, with a depth of 20 fathoms. Mount Douglas, a remarkable hill 696 feet high, with its summit bare of trees, rises immediately over the coast at the head of the bay.

Johnstone reef, on which there is a depth of 5 or 6 feet, lies three-quarters of a mile from the shore, midway between Cadboro point and Gordon head; it is marked by kelp, and of small extent.

Three shoal patches, with from 6 to 12 feet water on them, lie from one to $1\frac{1}{2}$ miles W. $\frac{1}{2}$ S. from Zero rock, but there is a clear passage of nearly one mile in width with 20 fathoms water, between the rock and the nearest shoal.

The tidal streams are not much felt in Cormorant bay when westward of the Zero rock, and the holding ground is good.

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* *See* Views on Admiralty chart:—Haro and Rosario straits, No. 2,689; scale, $m = 0{\cdot}5$ inch.

Directions. — To enter Cormorant bay southward of Zero rock, coming from the northward bring Mount Douglas to bear S. W. ½ S., and steer for it; when the western points of Discovery and Chatham islands are well shut in by Cadboro point, a vessel will be westward of Zero rock, and can take up a berth in 9 or 10 fathoms water, at one mile off shore, with Mount Douglas bearing S. by W., and Gordon head in line with the lighthouse on Discovery island bearing S.E. by E. ¼ E.

To enter this bay northward of Zero rock, the Kelp reefs, which lie from 2 to 2½ miles N.E. by N. from the rock, must be avoided; the positions of both rock and reefs will generally be easily distinguished from a vessel's deck one mile off. By steering for Cowitchin head (a very remarkable high white cliff at the northern end of Cormorant bay), on a W. ½ S. bearing, will lead in mid-channel, and good anchorage will be found in 8 to 10 fathoms water, at from one to 2 miles off shore with the head on that bearing.

This anchorage is more exposed to S.E. winds than the one last mentioned, but a vessel with good ground tackle will always be perfectly safe.

Anchorages.—Although there are many harbours among the archipelago which form the Haro strait and its tributary channels, yet the number eligible for sailing vessels overtaken by darkness, or an adverse tide, is comparatively small.

Between Cormorant bay and the northern entrance of Haro strait, Plumper sound and Cowlitz bay are the only eligible stopping places for a sailing vessel seeking shelter.

Stuart island has two fair harbours, and Roche harbour at the northwest end of San Juan island is a suitable anchorage for steamers or small coasters, but no sailing vessel of moderate tonnage could enter either under ordinary circumstances without great loss of time as well as risk.

Tides.—The tidal streams set fairly through the main channel of Haro strait, outside the Kelp reefs, and inside them through the Cordova and Sidney channels; passing outside the Kelp reefs and eastward of Sidney island, a part of the flood stream will be found to branch off to the eastward between San Juan and Stuart islands, and there meeting the flood from the Middle channel, cause heavy races and eddies, so that although there are deep water channels between these islands, they are not recommended for sailing vessels. In like manner the flood runs to the N.W. between the group of islands, northward of Sidney island, and through Shute and Moresby passages, though the main stream will be found to run fairly between Stuart and Moresby islands.

PLUMPER SOUND.—If from any cause it should be found necessary to anchor in that bend of the Haro strait between Stuart island and the east point of Saturna island, Plumper sound is recommendedas a safe

and convenient harbour, easy of access with the wind from any quarter. It is formed between Pender and Saturna islands, and the entrance lies 5 miles N.N.E. ½ E. from Turn point of Stuart island, and an equal distance from the East point of Saturna. Blunden island, about 2 cables in length, and close to the shore of Pender island, with only a boat passage (choked with rocks and kelp) between, forms the western entrance point; Monarch head (Saturna island), a high bold rocky headland, the eastern. The sound trends in a W.N.W. direction for 6 miles, with an average breadth of 1½ miles; there is anchorage in a moderate depth of water in most parts of it, as well as in several bays or harbours if preferred.

There are no dangers at the entrance, but a vessel should not attempt to pass between Blunden island and the shore, as a rock with only 9 feet water on it lies in the centre of the passage; which is generally choked by kelp. Either shore may be approached close when working up, and but little tide is felt; for the first 2 miles the sound is one mile in breadth, and for this distance the water is too deep for convenient anchorage, being generally from 25 to 50 fathoms, except on the south side, where if necessary an anchor may be dropped at one-quarter of a mile from the shore, in from 10 to 12 fathoms water.

At 2 miles within the entrance the depth decreases rather suddenly to 10 fathoms, and excellent anchorage may be had in almost any part; the most convenient is off the entrance to port Browning on the south side of the sound in 8 fathoms, at half a mile from the shore, with the east point of Blunden island just open of the land to the westward of it, bearing E. ½ S. Above port Browning the only danger to be avoided in working up the sound is Perry rock, with 6 feet water on it, marked by kelp; it is 2 cables from the shore, and three-quarters of a mile N.W. by N. from Razor point, the north point of the port.

PORT BROWNING is on the south side of Plumper sound, 3 miles inside the entrance; it takes a westerly direction for 1½ miles, and is one-third of a mile wide, but rather less at the entrance. The depth of water decreases gradually from 10 fathoms at the entrance to 4 fathoms at its head, with good holding ground. The best anchorage is in the centre just above Shark cove, which is a convenient creek, with 4 fathoms water in it, on the south side of the harbour, three-quarters of a mile within the entrance; here a ship might beach and repair on a sandy spit. The cove is separated from Bedwell harbour (on the south coast of Pender island) by a narrow neck of land 150 yards wide, across which the natives launch their canoes.

LYALL HARBOUR and WINTER COVE, in the south-east corner of Plumper sound, are indentations in the north-west end of Saturna island.

Lyall harbour is the southernmost, and its southern entrance point, a cliffy bluff, bears N. ½ E., distant 2 miles from the entrance to port Browning.

King islets, two low rugged islets, with a reef extending nearly one cable's length off their western end, form the northern entrance, which is half a mile in breadth. The harbour takes an easterly direction for 1¼ miles, gradually narrowing and terminating in a sandy beach with a good stream of fresh water at its head; the depths decrease regularly from 8 to 4 fathoms.

The Crispin rock, with only 6 feet on it at low water, decreases the value of this harbour for sailing vessels. The rock is a mere pinnacle, lying nearly half a mile within the entrance, and there is no kelp to indicate its position. It lies exactly in the middle of the harbour half a mile E. by S. ¼ S. from the centre of the outer King islet, and three-quarters of a mile N.E. from the south entrance point of the harbour; there is, however, a clear passage on either side of it 1½ cables wide, and a vessel anchoring above it should drop her anchor in 5 fathoms, at half a mile from the beach at the head of the harbour.

The anchorage outside the rock is with outer King islet bearing N.W. by N., and the south entrance point bearing S.S.W. ½ W., at about one-third of a mile from the former, in 7 fathoms, muddy bottom.

Boot cove on the south side of the harbour, one-third of a mile inside the south point, has 3 fathoms water, and is a convenient spot for repairing a vessel; a small islet lies off its western entrance point.

SAMUEL ISLAND, between Saturna and Mayne islands, is almost connected with both, but leaving two passages by which boats or even small coasters may pass into the strait of Georgia at proper times of tide. This island is indented on its southern side by several bays.

Winter cove is formed between the south-eastern side of Samuel island and the north-west point of Saturna, and is only half a mile northward of Lyall harbour. The depth of water in the cove being only from 2 to 3 fathoms, it is only fit for small vessels, which must pass to the westward of King islets, and on either side of the Minx reef. The outlet to the strait of Georgia from its north-east corner is merely a boat passage, and is not above 90 feet in breadth, and the tides rush through with great rapidity; coasting vessels might pass into the strait by taking the passage at slack water, or boats overtaken in the strait by bad weather might take shelter under the lee of Belle chain, and enter Plumper sound by this pass on the flood tide; the south-easternmost island of Belle chain is only half a mile north from the pass.

Water is easily obtainable during the winter or rainy months from streams in almost any part of Plumper sound. At the head of Lyall harbour or port Browning, constantly in the former, a certain quantity may be procured during the driest months of summer from June to August.

NAVY CHANNEL is a continuation of the western part of Plumper sound, and leads between Pender and Mayne islands into the Trincomalie channel.

Independently therefore of its value as an anchorage, Plumper sound becomes a high road for vessels bound into the strait of Georgia or Fraser river by the Active pass; or to Nanaimo, or any of the north-western ports of Vancouver island. From the north-western end of the sound abreast Fane island the channel takes a westerly direction for 3 miles, when it enters Trincomalie channel between Mayne and Prevost islands; its average breadth is half a mile.

Conconi and Enterprise reefs.—Conconi reef lies about midway through Navy channel, $1\frac{3}{4}$ miles from Fane island, and nearly 2 cables off the northern shore, and narrows the strait at that part to one-third of a mile. It is a ledge of rocks extending in the direction of the channel for more than one cable's length, and covering at half tide; its vicinity is marked by kelp, and a patch of 2 fathoms extends nearly 2 cables' lengths westward from it. The general depth of water in the channel is from 20 to 30 fathoms.

The Enterprise reefs are two rocky patches, the westernmost of which is covered at one-quarter flood, and both are marked by kelp. The outermost of these reefs lies one mile W.N.W. from Dinner point, the north-west entrance point of Navy channel; and two-thirds of a mile S. by E. from Helen point, the south point of Active pass. A patch of 2 fathoms lies 2 cables' lengths E.S.E. from the westernmost rocky patch.

Beacons.—A beacon 22 feet above high water has been erected on Enterprise reef, near its western extremity; to the pyramidal framework of the beacon are fixed two disks at right angles to each other, having the appearance at a distance of upper and lower balls. The whole is coloured white.

On Helen point (nailed on a dead fir tree) is a diagonal white board, with a corresponding one on the opposite bight. These marks when in line, bearing N. 9° W., lead over north-west extreme of Enterprise reef; and when they come well open a vessel can steer for Active pass.*

Directions.—Vessels using Navy channel should keep rather southward of mid-channel. The shores of Pender island are bold. When passing out of the western entrance, if bound through Trincomalie channel or Active pass, steer over towards Prevost island until Pelorus point (the east point of Moresby island) is open of Mouatt point (the west point of Pender island) bearing S.E. $\frac{1}{2}$ S.; then haul up N.W. $\frac{1}{2}$ N. keeping the

* Captain H. Rose, R.N., H.M.S. *Triumph*, August 1886. Navigating Lieut. Thompson Maclean, R.N., H.M.S. *Pelican*, February 1886.

marks just open, which will lead over one-third of a mile to the westward of Enterprise reefs.*

When Helen point, which is a low bare yellow point, bears N. by E., or the northern beacon comes well open west of the southern one, a vessel may steer for the entrance of Active pass, or shape her course up the Trincomalie channel.

Tides.—The flood tide from the Swanson channel runs through Navy channel to the eastward, and meets the flood in Plumper sound, causing a slight ripple at the east entrance; its strength is upwards of 3 knots.

BEDWELL HARBOUR, the entrance to which lies 3 miles North from Turn point of Stuart island, and is the same distance westward from the southern entrance of Plumper sound, is, on account of its narrower entrance, not so eligible a stopping place for vessels waiting the tide as the latter; but for steamers it is a good harbour. Its narrowest part, which is at the entrance, is one-quarter of a mile in breadth, but it soon opens out to half a mile, and trends in a W.N.W. direction for 2 miles, with depths of from 5 to 10 fathoms, mud bottom.

Drew rock.—The only danger which does not show is the Drew rock, with 10 feet water on it, in the centre of the harbour one-third of a mile from its head; there is, however, no necessity for a vessel to go as far up as this.

Anchorage.—The most convenient anchorage is in a bay on the north shore, two-thirds of a mile within the entrance, in 8 fathoms water, midway between Hay point and the Skull reef; the latter always shows some feet above high water.

CAMP BAY, between Bedwell harbour and Plumper sound, and half a mile westward of Blunden island, offers shelter as a stopping place to small craft, when not convenient for them to work into either of these ports.

STUART ISLAND, lying 3 miles north-westward from the northern part of the island of San Juan, is 3 miles long in an east and west direction, of an irregular shape and 642 feet high, the summits of the hills being partially bare of trees.

There are two anchorages in Stuart island, Reid harbour on its southern side, and Prevost harbour on its northern, but both are small and intricate for sailing vessels larger than coasters.

Turn point, the north-west extreme of Stuart island, a bold cliffy bluff, forms the salient angle of the Haro strait, where it changes its direction suddenly from N.W. by N. to N.E. before entering the strait of Georgia.

Reid harbour.—To enter Reid harbour from the southward, beware of being drawn by the flood into the channel between San Juan and Stuart

* *See* View C, on Admiralty chart:—Haro Strait and Middle Channel, No. 2,840; scale, $m = 1{\cdot}0$ inch.

islands, where there are several dangers, and the tides are most irregular in their direction. The south-west side of Stuart island should therefore be first closed; it is bold and free from danger.

The harbour lies one mile N.W. from Spieden bluff (a remarkable bare grassy point, generally of a yellow colour), the western extreme of the island of the same name. Gossip island lies in the entrance, from which a shoal extends 1½ cables' lengths W. by N., leave it on the right hand when entering. The channel is 1½ cables wide with depths of from 4 to 5 fathoms, and no dangers but what are visible. When a short distance within, the harbour increases to one quarter of a mile in breadth, and trends in a westerly direction for about one mile, the general depth of water being 4 fathoms. The best anchorage is off an Indian village on the south side at about half a mile within the entrance.

Prevost harbour, on the northern side of Stuart island, 1½ miles eastward from Turn point, has James island lying in the centre of it. The entrance is to the westward of this island, between it and Charles point, and is about 2 cables in breadth, the harbour extending south for a short distance, and then taking an easterly direction. Anchor in 6 fathoms as soon as the eastern arm opens out, or if desired run up the arm into 4½ fathoms; here it is narrow, but perfectly sheltered. The passage to the eastward of James island is a blind one, but a vessel may anchor, if necessary, at its entrance in 10 or 12 fathoms water.

JOHNS ISLAND, with its numerous off-lying reefs, lies to the eastward of Stuart island, and is separated from it by a navigable channel of 10 fathoms, but it is narrow and not recommended except for coasters acquainted with the locality.

Several islets and rocks, all above water, extend three-quarters of a mile south-east from the east end of John's island; the most southern of these are called Cactus islands, between which and Spieden island is the east entrance to New channel.

Gull reef, 2 feet above high water, lies half a mile W. ¾ N. from Cactus islands; rocks extend from it in an easterly direction for more than one cable's length.

SPIEDEN ISLAND, lying between San Juan and Stuart islands, is 2¼ miles long in an east and west direction, and very narrow; its southern side grassy and bare of trees, its summit and northern side thickly wooded; Green point, its eastern extreme, is a sloping grassy point.

There is a channel on both sides of Spieden island; New channel to the northward, and Spieden channel to the southward. It may sometimes be convenient to take either of these channels when passing from the Middle

channel to Haro strait, or vice versâ, as the distance round Stuart island will be saved; but from the strength and irregularity of the tides, and the number of hidden dangers which exist in certain parts of them, they cannot be recommended for sailing vessels, nor indeed to any vessel without a pilot, except those thoroughly acquainted with the locality.

SPIEDEN CHANNEL, between Spieden island and San Juan, has a general W. by S. and E. by N. direction. Its eastern entrance, between Green point and the north-east point of San Juan, is two-thirds of a mile wide, and for 2 miles the water is deep and clear of dangers; the meeting of the flood-tide, however, from Haro strait with that from the Middle channel, causes heavy ripplings and irregular eddies, and these, together with the general absence of steady winds, renders the navigation always tedious and dangerous for sailing vessels; its western entrance is encumbered with numerous reefs and shoals with irregular soundings.

Sentinel island lies in the western entrance of this channel. It is small, bare on its southern side, and about 150 feet high, it bears E.S.E. two-thirds of a mile from Spieden bluff; the passage between it and Spieden island is more than one cable wide, with a depth of 25 fathoms. A vessel using the Spieden channel is recommended to keep Spieden island shore aboard, and to pass between it and Sentinel island. There is much less tide here than in the centre of the channel, or on the San Juan shore. Sentinel rock lies 2 cables W. by N. ½ N., from the island, the passage between, being choked with kelp.

Centre reef is a dangerous patch, awash at low water, lying almost in the centre of the channel. It lies nearly half a mile S.W. by S. from Sentinel island, more than two-thirds of a mile S.E. by S. from Spieden bluff, and one mile N.N.E. ½ E. from Morse island; kelp will generally be seen around the reef, but it is sometimes run under by the tide. There is a passage 2 cables wide between the reef and Sentinel island, with a depth of 17 fathoms. Both the flood from Haro strait, and the ebb through Spieden channel set on to the reef; therefore, when nearing it, the San Juan shore should be kept aboard, avoiding the shoal which lies 1½ cables N. by W. ¼ W. from Bare islet.

Danger shoal is also at the western entrance; it has 2 fathoms water on it, and is marked by kelp, though this is not always seen. It lies three-quarters of a mile S.S.W. ¾ W. from Spieden bluff, nearly one mile N. by W. from Morse island, and a little more than one mile W.S.W. from Sentinel island.

Bare islet, a rock about 15 feet high, lies in the southern part of the channel, one mile E. by N. ½ N. from Morse island. There is a shoal

patch of 15 feet which lies nearly 1½ cables N. by W. ¼ W. from the islet; this patch is always covered with kelp; depths of from 3 to 5 fathoms extend nearly 2 cables' lengths westward from the patch.

Directions.—Vessels bound from Haro strait to the eastward through the Spieden channel, should pass about one-quarter of a mile to the northward of Morse island, and then steer N.E. by E. ½ E. for Green point (the east extreme of Spieden island) until Sentinel island bears N.N.W.; the dangers in the western entrance will then be passed, and a straight course may be steered through; bearing in mind that less tide will be found near Spieden island shore.

Bound westward through this channel, if the passage between Spieden and Sentinel islands is not taken, the shore of Spieden island should be kept aboard to avoid the tide races. If Centre reef is awash, or the kelp on it is seen, pass one-quarter of a mile South of it, and steer to pass the same distance northward of Morse island. If Centre reef is not seen, take care not to bring Morse island to bear to the southward of S.W., until Bare islet bears S.E.

NEW CHANNEL to the northward of Spieden island, though narrower than the one just described, is deep, more free from danger, and the navigation of it more simple. The northern shore of Spieden island is bold and steep, and should be kept aboard; the narrowest part of the channel is one-quarter of a mile wide between Spieden and Cactus islands, and care should be taken not to get entangled among the reefs to the northward of the latter. The flood tide sets to the north-eastward among them; but it also sets fairly through New channel, and by keeping the Spieden island shore aboard, there will be no danger of being set to the northward; the ebb tide runs to the south-westward between Spieden and Johns islands.

SAN JUAN ISLAND, the western coast of which forms for some distance the eastern boundary of Haro strait, is of considerable size, being 13 miles in length in a N.W. and S.E. direction, with an average breadth of about 4 miles. Its western shores are steep and rocky, and afford no anchorage; depths of from 100 to 150 fathoms being found within half a mile of the coast. Mount Dallas rises abruptly to a height of 1,086 feet, but the eastern side of the island falls in a more gentle slope, and affords a considerable extent of good land available for agricultural or grazing purposes. Towards the southern end, and visible from seaward, are some white buildings, the farming establishment of the Hudson bay company; the south-eastern extreme, which forms one of the entrance points of the Middle channel, terminates in a white clay cliff, over which rises mount Finlayson to a height of 550 feet, remarkable as being entirely clear of trees on its southern side, while it is thickly wooded on the

northern. There is a clean gravel beach under mount Finlayson, where boats can generally land.

Henry island.—Off the north-west end of San Juan lies Henry island, only separated from it by a narrow channel (Mosquito passage); it might be easily taken for a part of San Juan, the passage appearing merely as an indentation in the latter. Kellett bluff, the south-west point of the island, appears as the most prominent headland on the eastern side of Haro strait, when seen from the southward. Immediately eastward of it is Open bay, which has more the appearance of a channel than Mosquito passage, the true one. There is no shelter in the bay, or anchorage in the passage, for anything but coasters.

Mosquito passage trends in a northerly and N.N.W. direction for 3 miles, is a little over half a mile in breadth, and is studded with numerous reefs marked by kelp. When one mile inside the passage, Westcott creek, an indentation in San Juan, branches off to the N.E., and affords a haven for coasters. There is a 2-fathom channel through the passage, and into this creek; the only directions necessary are to avoid the kelp patches; the tide sets strongly through it.

Roche harbour.*—The northern entrance of Mosquito passage, between San Juan and Henry islands, opens out into a landlocked harbour half a mile in extent with depths of from 6 to 8 fathoms over the greater part of it. This space forms Roche harbour, which must be entered from the northward by vessels of burthen; its entrance is somewhat confined, but not very difficult of access, and it affords good shelter when within.

Morse island, a small flat cliffy island, about 30 feet high, lies one-quarter of a mile W.N.W. from the north point of Henry island; and the entrance of Roche harbour is half a mile eastward from the former.

Pearl island, about 4 cables long east and west, and 1½ cables broad, and wooded, lies in the centre of the passage, forming two entrances, the eastern of which, however, is barred; off the north side of Pearl island is a small islet (Neck) connected to it at low water.

Directions.—To enter Roche harbour pass as near as convenient northward of Morse island, as there are no dangers outside it, steering E. ½ S. for a little more than half a mile; the entrance will then open out between Henry island and the west point of Pearl island.

The breadth of the entrance between Inman point (Henry island) and the shore of Pearl island is over 2 cables, but the navigable channel is contracted to little over half a cable by shoal water which extends off both shores.

* *See* Admiralty plan of Roche harbour and approaches, No. 602; scale, $m = 6$ inches.

Scout patch, a dangerous spit projecting from the western shore just south of Inman point, has only a depth of 17 feet on it at low water; and although there is a depth of 5 fathoms in mid-channel, great care must be exercised to avoid this patch by vessels drawing over 14 feet. Vessels of less draught may approach the shores on either side to within three-quarters of a cable; and immediately within Pearl island, the harbour opens out to a considerable breadth.

Anchorage.—A good anchorage is in 6 fathoms, with the west end of Pearl island bearing N.W., distant about one-quarter of a mile, and the north part of Henry island just open of it. If working in, remember that a shoal of 15 feet lies 1½ cables northward from Bare islet, and that fair anchorage may be had in 9 fathoms off the entrance; but a vessel should get in far enough to be out of the tides of Spieden channel. Small vessels leaving Roche harbour, and bound southward, may take the Mosquito passage.

Tides.—The time of high water at full and change in Roche harbour is irregular; springs rise 12 feet.

WALDRON ISLAND lies in the northern entrance of the Middle channel, but as its anchorages are frequently available for vessels passing to or from Haro strait, it seems desirable that it should be described while treating of that neighbourhood.

The island is thickly wooded, moderately high, and cliffy on its southern and eastern sides, but falling to the northward, where it terminates in low sandy points. Disney point, its southern extreme, is a remarkable high stratified bluff.

Cowlitz bay, on the western side of Waldron, between Disney and Sandy points, affords good anchorage with all winds, the depth of water from 5 to 8 fathoms, and the holding ground stiff mud; it may be sometimes more desirable for sailing vessels to anchor here than to work 2 or 3 miles up into Plumper sound, particularly for those coming up Middle channel. If entering from the northward or westward, Sandy point may be passed at a distance of one-third of a mile, and standing into the bay anchor on the line between it and Disney point in 5 or 6 fathoms; the latter point bearing S.E. by E., and the centre of White rock S. ½ W. If a south-easter is blowing, a vessel may stand far enough in to get smooth water under shelter of Disney point; no sea, however, to affect a vessel's safety gets up in this bay with any wind. The only danger in the bay is Mouatt reef, with a depth of only 3 feet on it; it lies half a mile N.W. ½ N. from Disney point with deep water between it and the shore.

If entering from the southward, Disney point should be kept at within less than half a mile, particularly on the ebb, for as soon as Douglas

channel (the continuation of Middle channel) is opened out, through which the tide sets sometimes at the rate of 5 knots, a vessel is apt to be set down on Danger rock.

White rock, fronting Cowlitz bay, is 35 feet above high water, and bare, it has a sunken reef extending 2 cables' lengths to the north-west from it.

Danger rock.—This dangerous reef, with a depth of only 5 feet on it, and on which the kelp is rarely seen, lies one-third of a mile S.E. by E. $\frac{1}{2}$ E., from White rock.

Caution.—It is particularly recommended to give these rocks a wide berth, as with the strong tides, the water is too deep for anchorage in case of getting entangled among them in light winds.

NORTH BAY, on the north-west side of the island, affords anchorage in 8 to 10 fathoms water about one quarter of a mile off shore, but is not by any means such a desirable place as Cowlitz bay, the bank being rather steep, and the tide more felt.

CHAPTER II.

THE WESTERN CHANNELS AND ISLANDS TO GABRIOLA PASS.

VARIATION 23° 5′ to 23° 15′ East, in 1888.

The WESTERN CHANNELS of HARO STRAIT* may be used with advantage by steamers or coasters bound from the southern ports of Vancouver island to the strait of Georgia, or to the districts of Saanich, Cowitchin, Nanaimo, and the numerous intermediate harbours; their advantages over the Haro strait consist in the strength of tide being less, besides sheltered anchorage being obtainable in almost all parts; while in the latter strait the depth of water is so great that it is impossible to anchor, and sailing vessels may frequently be set back into Fuca strait, thus entailing great delay as well as risk. On the other hand, the western channels are not free from danger, yet, with the assistance of the chart, and a good look-out from aloft for kelp, a precaution which should never be neglected, they may be navigated during daylight with ease and safety.

To vessels passing from the southward, and intending to take the western channels, the dangers to be avoided after passing Discovery and Chatham islands, are Johnstone reef (page 52), lying nearly one mile from the shore, midway between Cadboro point and Gordon head, Zero rock (page 50), which lies in the fairway; and the shoals which extend off Darcy, Sidney, and James islands.

SIDNEY CHANNEL between James and Sidney islands is the best; it is nearly one mile wide, with depths of from 14 to 20 fathoms, until near its northern end, where shoal patches with only 6 to 9 feet water on them, marked by kelp, lie 3 to 5 cables' lengths off the western point of Sidney island. Whale islet, a small rock only 6 feet above high water, lies at the southern entrance to Sidney channel, and is joined to

* *See* Admiralty chart:—Haro and Rosario straits, No. 2,689; scale, $m = 0{\cdot}5$ inches; also Admiralty chart:—Haro strait and Middle channel, No. 2,840; scale, $m = 1{\cdot}0$ inch.

Sidney island by a sand spit. Sidney spit, the north-west end of the island, is a low sandy tongue with a few trees on its extreme. There is good anchorage off this spit in 8 fathoms water.

Beacon.—A beacon consisting of a cone 40 feet high, surmounted by a pole and cage 10 feet high, the whole coloured white, has been erected on Sidney spit.

CORDOVA CHANNEL between James island and the main island of Vancouver, is a fair passage with little tide; it is not, however, to be preferred to Sidney channel, neither is any saving in distance gained by taking it, and it cannot be recommended for vessels drawing over 14 feet, as the navigable channel at its southern entrance between the banks extending off from the south-west bluff of James island, and the main island shore, is only 3 cables wide, and has a sand bank over one cable in extent, with 15 feet water on it lying in the centre of the passage. A little northward from Cowitchin head a low flat of swampy land extends for two miles in a N.N.W. direction, and about one-quarter to half a mile off the high land; shoal water extends from one to 2 cables' lengths outside this flat which forms the western side of the southern entrance of the channel.

The southern face of James island is a moderately high and steep white clay cliff, its summit covered with trees; towards the eastern part of this cliff are two remarkable notches on its summit. A bank, having from one to 3 fathoms water on it, extends one mile to the eastward, and nearly half a mile to the southward, and westward from the south-west bluff of James island. A shoal three-quarters of a mile in extent, having depths of from 1½ to 3 fathoms on it, lies south-eastward from the island, the centre of it bears S.E. by E. ½ E., distant 1¼ miles from south-west bluff James island.

DIRECTIONS.—If the passage inside Discovery and Chatham islands has been taken, and intending to take the Sidney channel; when abreast Cadboro point, steer N.N.W., keeping the passage between that point and Chatham islands open astern, until mount Tuam (on the southern point of Admiral island) is in line over the centre between the two remarkable notches on James island bearing N.W. by W.,* this mark will lead nearly one mile eastward from Zero rock, 3 cables westward from the 3 fathom patches off Darcy island, and between them and the shoal of 9 feet extending south-eastward from James island.

When Morse island is in line with the south-east point of Sidney island, bearing N.E. ¾ N., alter course to N.N.W., to avoid the shoal which

* *See* View D, on Admiralty chart:—Haro strait and Middle channel, No. 2,840; scale, $m = 1 \cdot 0$ inch.

extends one mile E. by N. ½ N., from south-west bluff of James island; pass about 3 cables' lengths westward from Whale islet, and then steer up mid-channel, and avoid the shoal patches off the west end of Sidney island, by not shutting Whale islet in with Darcy island, until the end of Sidney spit bears North.

If passing outside Discovery and Chatham islands, at about one mile off shore, steer N.W. ½ N., until the leading marks (mount Tuam in line between the two remarkable notches on James island, bearing N.W. by W.) are on, when proceed as before directed.

MINERS CHANNEL.—Low and Bare islands are two small islands lying off the eastern side of Sidney island, and between them and the latter there is a good passage, half a mile in breadth, with 8 fathoms the least water; a 3 fathom patch one cable in extent lies 2½ cables N. by E., from the east point of Sidney island, the southern entrance of the channel. This channel may often prove convenient for vessels having passed up Haro strait eastward of the Kelp reefs, and desiring to take the inner channels to Saanich, Cowitchin, or through Stuart channel.

Anchorage.—The eastern side of Sidney island affords good anchorage in 8 fathoms water out of the tide, off a bay S.S.W. from the north end of Bare island; the bay is shoal as far out as a line between its entrance points.

Reef.—Midway between Low and Bare islands, and on the line, between their north-west points, is a reef which uncovers; and a rock which nearly uncovers lies 4 cables N. ½ W., from the north-west end of Low island. There is a rock 3 feet above high water bearing W. by N. ½ N., distant one-third of a mile from the north-west end of Bare island.

After passing Bare island a course should be steered between Sidney spit and Jones island. Having passed to the northward of Sidney island, either by Cordova, Sidney, or Miners channels, the Shute or Moresby passages may be taken as convenient; if bound for Saanich, Cowitchin, or through Stuart channel, the former is preferable, while the latter offers a more direct course through the Swanson or Trincomalie channels, or to Fraser river by Active pass.

SHUTE PASSAGE.—To enter this passage, after leaving Sidney spit, pass between Jones island and the Little group, then eastward of Coal island, Knapp and Pym islands, and between Piers and Portland islands, when the Satellite channel will be entered, which leads directly to Saanich, Cowitchin, and the western ports of Vancouver island. This is a good clear channel, and with the assistance of the chart may be used with much facility.

Jones island lies two-thirds of a mile north from Sidney spit, with a clear passage between, of from 15 to 20 fathoms water; shoal rocky ground extends one cable's length westward from the north-west point of Jones island, and the tides set with considerable strength (2 to 5 knots) round this point; detached rocks extend two cables' lengths, eastward from the east end of the island.

Tree, Hill, Domville, Comet, and **Gooch** islands, which lie in the fairway between Sidney and Moresby islands, are moderately low, and wooded, but the passages between them are not recommended unless to those well acquainted with the navigation of this locality.

Reefs.—North Cod reef is about 2 cables' lengths in extent, and covers at one-quarter flood, it lies 4 cables S. ½ E., from the west end of Gooch island.

South Cod reef, also about 2 cables in extent, has only 6 feet on it at low water, it lies 7 cables S. ½ E., from the west end of Gooch island, and 9 cables E. ¾ N., from the south-east end of Jones island; both reefs are marked by kelp.

A patch of two fathoms, marked by kelp, lies nearly midway between the southern end of Jones and Domville islands; the passage between Gooch and Comet islands is filled with kelp.

The Little group lie two-thirds of a mile W. by N. from Jones island. They consist of four rocky islets, one-third of a mile in extent east and west, bare of trees, and connected by reefs; there is a good passage of 12 fathoms water between them and Jones island, and their eastern side may be passed at one cable's length.

Bird islet, lying on the eastern side of Shute passage, and two-thirds of a mile N.N.W. from the north point of Jones island, is about 6 feet above high water, and has a cluster of reefs around it almost one cable's length in extent, marked by kelp; between it and Coal island there is a clear passage one mile wide, with from 20 to 30 fathoms water.

Coal island, which helps to form the western side of Shute passage, lies close off the north-east extreme of the Saanich peninsula, and immediately at the entrance of Shoal harbour; it is one mile in extent and thickly wooded, and its eastern and northern shores are free from danger.

When working up the passage between Bird islet and Coal island, a vessel should not stand to the westward of a line joining the east end of Little group to the east point of Coal island, as a rock which covers at one-quarter flood lies 4 cables W.N.W. from the east end of the group, and nearly two-thirds of a mile S.S.E. from the east point of the island.

Reefs.—A small patch with 4 fathoms water over it, and probably less, and marked by kelp, lies one mile N.E. from the east point of Coal island, more than three-quarters of a mile N.N.W. ½ W. from Bird islet,

and one-third of a mile S.W. from Yellow islet. When abreast the east point of Coal island, and distant one-third of a mile, a W.N.W. course will lead through Shute passage in mid-channel, passing eastward of Pym island,* off the eastern side of which, a reef which uncovers, extends a little more than one cable's length.

Celia reef which lies between Pym and Portland islands, must also be avoided. The least water found on it is 8 feet; it is marked by kelp, and lies two-thirds of a mile North from the north point of Pym island.

Yellow island kept just open to the eastward of Sentinel island, bearing E. ¼ S., leads more than one cable to the southward of Celia reef; and Beaver point (Admiral island), in line with Steep bluff (Portland island), bearing N. ½ W., clears it to the westward.

Knapp and Pym islands are small and wooded, lying between Piers and Coal islands. The passage between Piers and Portland islands is over one mile in breadth, with depths of from 10 to 20 fathoms, and no dangers which are not visible; about one cable's length off the eastern side of Piers island, is a rock always uncovered. Having passed westward between these islands a vessel is fairly in Satellite channel.

MORESBY PASSAGE.—After leaving the northern end of Sidney island, the directions for Moresby passage are the same as those already given for Shute passage, until abreast the east point of Coal island. From about one-third of a mile off this point, the direct course through the passage is N. ½ W., (Canoe rock beacon same bearing) for 2¼ miles, or, until Beaver point is in line with the easternmost channel islet in Ganges harbour, bearing N.W. ½ N., this mark will lead midway between Turnbull reef, and the Canoe rocks, which extend off Portland, and Moresby islands, narrowing the channel at its northern entrance to little over one-third of a mile.

The Sisters, off the eastern point of Portland island, are three rocky islets, which extend to a distance of nearly 2 cables. They are about 25 feet high, have a few stunted cedar trees on their summits, are joined by reefs, and will be immediately recognized either from the northward or southward.

Turnbull reef.—Eastward from the Sisters, at a distance of more than one-third of a mile, extends the Turnbull reef in a semicircular direction towards the north-west point of Portland island, and almost joining it; 2 fathoms is the least water found on its outer edge, and it is marked by a heavy bank of kelp, which, however (on account of the tide), is not always visible until close to it.

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* As patches of kelp have been seen extending some distance from the south side of Pym island, caution must be observed when passing between that island and Coal island.

Canoe rocks, a dangerous ledge extending nearly half a mile W. ¼ N., from Reef point, the north-west point of Moresby island; the outer rock of this ledge covers a little after half flood, and is not marked by kelp, though kelp grows between the point and the rock.

Beacon.—A stone beacon 25 feet high, surmounted by a cross and coloured black, is erected on the Canoe rocks.

Directions.—With the beacon on Canoe rocks visible, the passage is very easy, as the above dangers may be passed as close as convenient, and there are 11 fathoms water in mid-channel; but if the beacon is not visible, which may sometimes happen, then it is desirable when coming from the southward to borrow on the Moresby island shore, passing Seymour point, the western cliffy point of the island, at the distance of 2 cables.

Leading Mark.—Beaver point (the south-east point of Admiral island), in line with the easternmost Channel islet in Ganges harbour, bearing N.W. ½ N., leads midway between Turnbull reef and Canoe rocks; and a vessel will be to northward of these shoals when Chads island, just off the north-west point of Portland island, is seen just open of that point.

PREVOST PASSAGE lies between Moresby island and the group of smaller islands to the southward of it, and leads by the Shute or Moresby passages into Satellite channel.

To a vessel passing up the main stream of Haro strait and bound for the Swanson channel, the easiest and most direct route is between Stuart and Moresby islands; but circumstances of wind or tide may render it convenient to take the Prevost passage; for instance, with light winds she may be set into the passage by the flood, or, if near to Moresby island, by the ebb tide from the upper part of Haro strait, which runs here as it does in all other parts of the channel, from 2½ to 3 hours after low water by the shore, sets to the westward among the small islands, and down the Miners and Sidney channels.

Arachne reef.—The dangers to be avoided in Prevost passage are Arachne and Cooper reefs. Arachne reef lies nearly in the centre of the passage, in a direct line between Fairfax point (the south-east point of Moresby island) and Tom point (the east point of Gooch island); and 2¼ miles S.W. by W. ½ W. from Turn point of Stuart island. This reef covers at one-quarter flood, and has a good deal of kelp on its north-west edge, which, however, is frequently run under by the tide.

Cooper reef, lying half a mile N.W. by N. from Tom point (Gooch island), is marked by kelp, and uncovers at half ebb; there is a passage one mile wide between it and Arachne reef, the channel being about the same

width between the latter and Moresby island, with deep water. There are no dangers off the south or west sides of Moresby island.

Tom point, in line with the south-east point of Sidney island, bearing S.S.E. $\frac{1}{3}$ E., leads only just clear to the eastward of Cooper reef.

North part of Portland island, in line with south side of Moresby island, bearing W. by N. $\frac{3}{4}$ N., leads to the northward of Cooper and Arachne reefs.

Yellow islet, a small bare islet 8 feet high, lies $1\frac{1}{3}$ miles S.W. by W. from Fairfax point, and should be passed on the north side to clear the shoal of 3 fathoms which extends nearly 2 cables' lengths westward from the islet, and to avoid the small patch of 4 fathoms* marked with kelp, (*see* page 67) lying one-third of a mile S.W. from it; having passed westward of this island either the Shute or Moresby passages may be taken as convenient.

SATELLITE CHANNEL is formed by Admiral island on the north; and Moresby, Portland, and Piers islands, and the northern shore of Saanich peninsula on the south. It leads to Saanich inlet, Cowitchin harbour, and by the Sansum narrows to Stuart channel. It is a good, deep passage with but few dangers, which are not always visible; among these are Shute reef and Patey rock. The general breadth of the channel is one mile, with depths of from 30 to 40 fathoms, and the strength of tide from one to 2 knots, and sometimes 3 knots.

Shute reef is a ledge less than half a cable in extent, with two rocks, one of which is covered at 8 feet flood, its vicinity being marked by kelp. It lies two-thirds of a mile W.S.W., from Harry point, the north point of Piers island, and nearly 3 cables N. by E. $\frac{1}{4}$ E., from Arbutus, a small islet with two or three of the red stemmed arbutus growing on it, and lying half a mile westward from Piers island.

Patey rock, at the western end of Satellite channel, is a single rock, covered at 6 feet rise with kelp around it, and is in the way of vessels working into Saanich inlet or Cowitchin harbour. It lies two-thirds of a mile N.E. by N., from Hatch point, the westernmost point of Saanich inlet; nearly 2 miles N.W. by W. $\frac{1}{2}$ W., from Coal point, a remarkable nob point, the south extreme of Deep cove; and $3\frac{1}{3}$ miles S.W. by W. $\frac{1}{2}$ W. from Arbutus islet.

Clearing marks.—Harry point the north extreme of Piers island, open northward of Arbutus islet, bearing N.E. by E., leads 3 cables southward of Patey rock; and the high round summit of Moresby island, well open northward of Arbutus islet, bearing E.N.E., leads $3\frac{1}{2}$ cables to the northward of it.

* Possibly shoaler.

Cecil rock, with 2 fathoms water on it, lies one-third of a mile S.E. by E. ¾ E. from the south point of Russell island at the entrance of Fulford harbour, and must be avoided when working up Satellite channel.

Boatswain bank, on the western side of the channel, off the Vancouver shore, between Cherry and Hatch points, affords good anchorage in from 4 to 9 fathoms, sandy bottom; the outer edge of the bank in 10 fathoms is steep-to, it extends three-quarters of a mile E. by N., from Cherry point, and then trends in a S.S.E. direction, over three-quarters of a mile; from 1½ to 3 cables' lengths inside the 10 fathom line, the water shoals rapidly from 5 to 3 fathoms, the latter depth being found 4 cables' lengths from the shore. A good berth in 7 fathoms water, will be foumd, with cape Keppel bearing N.E. by E. ¾ E., and Hatch point bearing S.E. by S.

SAANICH INLET is a deep indentation extending in a nearly S.S.E. direction for 14 miles, and carrying deep water to its head, which terminates in a narrow creek within 4 miles of Esquimalt harbour. The inlet forms the south-east portion of Vancouver island into a peninsula of about 20 miles long in a N.N.W. and S.S.E. direction, and varying in breadth from 8 miles at its southern part, to 3 at its northern.

On the southern coast of this peninsula are the harbours of Esquimalt and Victoria, in the neigbourhood of which for some 5 miles the country is pretty thickly wooded, its prevailing features being lake and mountain, with, however, some considerable tracts of clear and fertile land; the northern portion for about 10 miles contains some of the best agricultural land in Vancouver island, the shore is fringed with pine forests, but in the centre it is clear prairie or oak land, and much of it is under cultivation; seams of coal have also been found.

Off the eastern or peninsula side of the inlet there are some good anchorages, the centre being for the most part deep. Immediately southward from James point (the north-western point of the peninsula), is Deep cove, but no convenient anchorage.

Norris rock, awash at half tide, lies 2 cables S.W. by S. from James point, with 12 fathoms water between it and the point. Vessels rounding this point should give it a berth of half a mile.

Union bay, at 2 miles southward from James point affords good anchorage in 8 or 9 fathoms water, half a mile from the beach; a shoal bank extends off 2 to 3 cables' lengths from the shore around the bay. There is a stream of fresh water in the south-east corner of the bay.

Cole bay, 1½ miles southward from Union bay, and immediately under mount Newton is small, but capable of affording shelter to a few

vessels of moderate size; off its north point are the White rocks, two small bare islets. Anchor in the centre of the bay in 8 fathoms, with White rocks bearing W.S.W. These bays are somewhat open to S.W. winds, but a gale rarely blows from this quarter, nor from the proximity of the opposite shore, distant scarcely 3 miles, could much sea get up.

Tod creek is 2 miles southward from Cole bay. Senanus island, a small wooded islet, 150 feet high, lies off its entrance, foul ground extends nearly one cable's length off the north-west side of the island, on the other sides the water is deep. A small islet, and a rock lying one cable's length north from it, lies in the entrance to the south-east part of the creek. A short distance inside it narrows rapidly and winds to the southward and south-east for three-quarters of a mile, with a breadth of less than one cable, carrying 6 fathoms nearly to its head.

There is anchorage in the outer part of the creek in 15 fathoms.

Squally reach.—From Willis point, the western point of Tod creek, the inlet known as Squally reach trends to the south-west for 2½ miles, the breadth of the arm here being three-quarters of a mile, with no bottom at 100 fathoms. Finlayson arm, its continuation, trends S. by E. ½ E. for 3 miles, and terminates Saanich inlet. Beacon rock, which covers at three-quarters flood, lies one cable, S.W. ½ S., from Elbow point, Finlayson arm. A small islet named Dinner, with deep water on either side, lies near the head of this arm, 1½ cables southward from which there is good anchorage in 9 fathoms. At 3 cables south from the islet, the arm terminates in a flat, which dries at low water. Immediately over the head of the inlet, on the eastern side, Leading peak rises to an elevation of 1,346 feet.

Mill creek bay is a fair anchorage, and the only one on the western side of Saanich inlet; a bank of sand and rock which has only from one to 3 fathoms water on it, extends two cables' lengths off, from the western shore, across the bay; a large stream flows into the north-west corner of the bay.*

COWITCHIN HARBOUR is 4 miles westward from cape Keppel, the southern extreme of Admiral island; Separation point (the western point of entrance to Sansum narrows), its northern entrance point, is somewhat remarkable, being the termination of a high, stony ridge, dropping suddenly, and running off as a low sharp point to the southward. Cowitchin harbour extends to the westward from this point for 2 miles, and the general depth of water in it is 30 fathoms, which shoals suddenly

* A rock, with only 6 to 9 feet water on it, lies almost in the centre of the bay, a short distance outside the 3 fathom line, nearly 4 cables S.S.W. ¼ W. from Ford point. Mr. John Devereux.

as the flat is approached, which dries off for more than half a mile from the head of the harbour.

But for the large tract of good land contained in the valley of Cowitchin, the port would scarcely be deserving of notice, and it is more of a bay than a harbour. In its north-west end is a considerable river, the Quamitchan, which flows through the fertile valley, and is navigable for small boats or canoes for several miles. There is a settlement here, off which is a long pier (on the south side of the harbour). Coming from the south-eastward the entrance is easily distinguished by the pier and lumber yard, just inside the point on the west side. Mail steamers call here twice a week.

Anchorage.—Snug creek.—The only convenient anchorage to be obtained is in Snug creek, on the north side of Cowitchin harbour, or off the outer village on the south side, 1¾ miles within the entrance; in the latter case a vessel must approach the shore within little more than one cable's length, and anchor cautiously, when 12 fathoms are obtained.

Snug creek is a convenient anchorage for small craft or coasters, and one or two vessels of moderate size might obtain anchorage and shelter in it; it extends in a northerly direction for nearly one mile, and is one-quarter of a mile in breadth. Nearly in the middle of the entrance is a rock which uncovers at low water in the centre of the kelp; it is about 20 feet in extent, and has 1½ fathoms water around it. The western point of entrance can be passed close as it is bold, and has 10 fathoms water within half a cable of it; when one quarter of a mile or less, inside the point, anchor in the centre of the creek in 6 fathoms.

SANSUM NARROWS take a general northerly direction between Vancouver and Admiral islands for a distance of 6 miles, when they lead into Stuart channel; the average breadth of this strait is about half a mile, but at their narrowest part abreast Bold bluff, on the Admiral island shore, 2½ miles above Separation point, they are contracted to one-third of a mile. The high land on both sides renders the wind generally very unsteady; from this cause as well as from the somewhat confined nature of the channel, and the depth of water which prevents anchoring, the Narrows cannot be recommended except for steamers or coasting vessels. There are but few dangers to be avoided, and the strength of the tides has seldom been found to exceed 3 knots, generally much less.

In the lower part of the Narrows southward from Bold bluff, the depth of water varies from 20 to 30 fathoms; to the northward of this point it increases immediately to 70 and 90 fathoms. Maple bay, on the Vancouver shore near the northern entrance, affords fair anchorage.

Entering Sansum narrows from the southward a kelp patch, with 9 feet water on it, on the Admiral island shore must be avoided. It lies 2 cables

S.S.W. from a small islet close to the coast, nearly one mile E. by N. from Separation point, and nearly half a mile S.E. ½ S. from Entrance point; there are 20 fathoms between it and the small islet.

Another rocky patch extends nearly one cable's length off shore from the eastern side of the Narrows; it lies 6 cables N.W. ½ W. from Entrance point.

Burial islet, a small spot used as an Indian burying-place, lies on the eastern side of the Narrows, 1½ miles above Separation point; pass outside it as close as convenient to the kelp.

Bold bluff, a smooth headland of bare rock, is steep-to; the channel here is scarcely one-third of a mile across. Rocky ground marked by kelp extends one cable's length off Kelp point on the western side, almost opposite to Bold bluff; northward from these points the Narrows increase in breadth to nearly one mile.

Burgoyne bay, the entrance to which is half a mile eastward from Bold bluff, is a narrow and rather deep indentation terminating in a sandy head; there is no bottom in the bay under 30 fathoms, until within 2 cables' lengths of its head, when the water shoals suddenly from 10 to 4 fathoms. Anchorage may be had if necessary.

MAPLE BAY.*—From Grave point the Narrows take a northwesterly direction, and at a distance of a little more than one mile on the Vancouver island shore is Maple bay. Boulder, the southern entrance point, is remarkable from a large boulder stone standing at its low water extreme. Although an inviting looking bay, the water is too deep for comfortable anchorage, being generally 40 fathoms, and 16 fathoms within one cable's length of a smooth sandy beach at its western end.

Bird's-eye cove, which takes a southerly direction for nearly one mile from Boulder point, affords fair anchorage at its entrance in about the centre of the cove, in 13 fathoms, mud bottom, with the boulder bearing N.E. ½ N.; the cove at this part is not more than one-third of a mile across; 2 cables' lengths southward from this anchorage, shoal water, 2 to 3 fathoms, extends three-quarters of a cable from each side of the cove, which is here only 2¼ cables wide; coasters may go up mid-channel into 4 or 5 fathoms near the head.

Tides.—The rise at springs in Maple bay is 12 feet.

STUART CHANNEL.†—Sansum narrows extend 1½ miles northward from Maple bay, when they lead into Stuart channel, the westernmost of the ship passages which lie on the eastern side of Vancouver island.

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* *See* Admiralty plan of Maple bay on chart No. 714; scale, $m = 3$ inches.

† *See* Admiralty chart:—Strait of Georgia, sheet 1, No. 579; scale, $m = 0{\cdot}5$ inches.

The western side of Stuart channel is formed by the shores of that island; its eastern, by the coasts of Admiral, Kuper, and Thetis islands; it extends in a general N.W. direction for nearly 20 miles, when it joins the Dodd narrows below Nanaimo. The general breadth of the channel is about 2 miles; the depth varies in the southern part from 60 to 100 fathoms, in some parts more, in the northern portion from 20 to 40 fathoms; the principal dangers are the North and Escape reefs, White rock, and Danger reef.

On the western or Vancouver island shore there are some good harbours, viz., Osborn bay, Horse-shoe bay, Oyster harbour, and Chemainos bay; on the eastern side there are also some anchorages, Telegraph and Preedy harbours on the western, and Clam bay on the eastern side of Thetis and Kuper islands.

OSBORN BAY,* the southernmost anchorage on the western side of Stuart channel, may be known by the Shoal islands, a low wooded group, extending over 3 miles in a W. by N. ½ N. direction, and connected at low water by reefs and mud banks; the south-easternmost of these islands which helps to form the northern side of Osborn bay, lies a little over 2 miles N.W. by W., from the north-west entrance point of Sansum narrows. The bay affords good anchorage, sheltered from the prevailing winds, from the westward and S.E.

Anchorage.—The best anchorage is in 10 fathoms, mud bottom, at half a mile from the southern head of the bay with the south-easternmost Shoal island in line with Southey point, bearing N. ⅓ W.; and the southern trend of the coast E. by S. ½ S.

The COAST trends in a W.N.W. direction for 4 miles, from Osborn bay to Horse-shoe bay, and is faced by the Shoal islands, and adjacent reefs and mud flats, for nearly the whole distance; and vessels should not approach this shore within half a mile; a rock awash at high water, lies nearly half a mile N.N.W. from the south-easternmost Shoal island. The northern point of the North Shoal island has a remarkable flat sandy spit, on which is built an Indian village; there are no passages between the small islands northward of this, and the bank dries off 2 cables' lengths at low water.

HORSE-SHOE BAY will be known by a rather remarkable sharp point (Bare point) bare at its extreme, which forms its eastern entrance. The bay extends in a southerly direction for two-thirds of a mile, and is one-third of a mile in breadth, sheltered from all except N.W. winds. There is a timber yard and saw-mill situated on the west side of the bay, from which spars may be obtained for shipping.

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* *See* Admiralty plan of Osborn bay on chart No. 714; scale, *m* = 3 inches.

Bird reef, a rocky ledge uncovering at half tide, extends one cable's length from the shore, north-westward from the western point of entrance, and lies half a mile W. by S. from Bare point.

Anchorage.—There is convenient anchorage for small vessels off the saw-mill, or within one-quarter of a mile of the head of the bay in 8 fathoms; within this distance the water shoals suddenly from 5 to 2 fathoms.

OYSTER HARBOUR* is 4 miles W.N.W. from Horse-shoe bay, the intervening coast being free from danger; the harbour extends in the same direction for 4 miles, is nearly one mile wide at the entrance, narrowing gradually within. Entering from the northward, Coffin islet should be given a berth of 2 cables; there are no other dangers which are not visible; at low water the Oyster beds dry for 2 cables' lengths off the south shore.

A reef which covers at half flood extends one cable southward from the Twin islands; half a mile above this the harbour narrows to one-quarter of a mile in width; the deepest water, from 5 to 3 fathoms, will be found at one cable's length off the west side of Long island on the northern shore; on the south side are the oyster beds; small vessels may go as far up as the west end of Long island, where 3 fathoms will be found at low water.

Anchorage.—A good anchorage for a large vessel is one mile inside the entrance in 9 fathoms, mud bottom, with the south-east end of Long island bearing N.W. by W. $\frac{1}{4}$ W., and east extreme of Twin islands bearing North; good anchorage may also be had in 6 fathoms, mud bottom nearly three-quarters of a mile farther up the harbour, with the south-east end of Long island bearing N.W. $\frac{1}{2}$ W., and west end of Twin islands bearing N.E. $\frac{1}{2}$ N.

Tides.—It is high water at full and change in Oyster harbour at 6h. 0m. p.m.; springs rise 10 feet.

CHEMAINOS BAY is $2\frac{1}{2}$ miles northward from the entrance of Oyster harbour, and the same distance W. by S. from Reef point, the north-west point of Thetis island.

Anchorage may be had in 8 fathoms at half a mile from its head, on a bank which projects from the southern shore, with Deer point, at the northern entrance of the bay bearing N.E., and the southern trend of the coast bearing S.E. by E.; but it is open and cannot be recommended, unless in fine weather, or with off-shore winds. There are no dangers in working into it.

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* *See* Admiralty plan of Oyster harbour, on chart No. 714; scale, m = 3 inches.

Yellow point, bare and grassy at its extreme, is the north point of Chemainos bay.

The COAST, from Yellow point to Round island, at the southern entrance of Dodd narrows, trends N.W. ½ W. 5 miles, is moderately bold and free from danger. In working for the narrows, White rock and Danger reef must be avoided. At 1½ miles southward from Round island is Boat harbour, at the entrance of which a vessel may drop an anchor in 8 to 10 fathoms if waiting for the tide, though there is equally good anchorage nearer to the narrows.

From the northern entrance of Sansum narrows to North reef, a distance of 4 miles, there are no dangers, and both shores may be approached boldly in working up, except, as before observed, the coast of Vancouver island from the Shoal islands to Bare point of Horse-shoe bay, which should be given a berth of half a mile.

North reef is a sandstone ledge extending in a north-westerly and south-easterly direction, as all the reefs in this channel do. It lies half a mile S. by E. ½ E. from the south-east point of Tent island, with a clear channel between of 26 fathoms. It is just awash at high water, and therefore easily avoided; its shoal part extends for one-third of a mile, in a W.N.W. direction, steep on its north and south sides.

TENT ISLAND, narrow and two-thirds of a mile long, lies off the south extreme of Kuper island. One cable's length off its south-east end are two remarkable worn sandstone rocks 8 or 10 feet above water, with a passage one-third of a mile wide between them and North reef.

Rock.—N.E. ½ E., nearly 2 cables from the south-east end of Tent island, is a rock which uncovers 2 feet, and has shoal water, 2 to 3 fathoms extending 2 cables' lengths around it. When passing eastward of Tent island, its eastern shore should be given a berth of half a mile, as some ledges extend off it. There is no ship passage between Tent and Kuper islands, there being a depth of only one fathom at low water.

Escape reef, 2 miles N.W. by W. ¼ W. from North reef, is a dangerous patch, nearly one-third of a mile in extent, in a W.N.W. and E.S.E. direction, which covers at one-quarter flood, and has no kelp to mark its position. It lies nearly half a mile from the west shore of Kuper island, 1¼ miles, W. ¼ S. from Josling (its south) point, and a little more than half a mile South from Upright cliff, Kuper island; there is a deep channel one-third of a mile wide between it and Kuper island. The two entrance points of Sansum narrows, just touching, lead on to the reef.

Leading marks.—Yellow point just open westward of Scott island, off Preedy harbour, bearing N.W. ¼ W. leads 3 cables' lengths westward

from the reef. The Sandstone rocks off the south-east point of Tent island kept open of that point also lead to the westward of it.

Alarm rock is scarcely in the track of vessels working up Stuart channel. It lies one cable S. by W. from the south-east point of Hudson island, the south-easternmost of the group of islands, which lie off the western sides of Kuper and Thetis islands, facing Preedy and Telegraph harbours. It just covers at high water, and is connected by a ledge with Hudson island.

False reef lies 3½ cables W. by N. ½ N. from Scott island, the north-westward of the group just mentioned, and a long half mile S.W. ½ S., from Crescent point, the north-east point of Preedy harbour; it covers at half flood.

White rock, about 30 yards long, and 15 feet above high water, lies one mile N.N.W. from Reef point, the north-west extreme of Thetis island; a bank having from 2 to 5 fathoms water on it extends 2 cables' lengths north-westward from the rock. This rock has a whitish appearance, and is readily distinguished from a vessel's deck at a distance of 2 or 3 miles. It should not be passed within 2 cables' lengths, and there is a good passage between it and Thetis island, giving Reef point a berth of half a mile to avoid a rocky ledge extending nearly that distance north-westward from it.

Ragged island, a low rocky islet, with a few trees on it, lies one-third of a mile W.N.W., from Pilkey point, the north end of Thetis island, with a passage of 12 fathoms water between them. There are no dangers one cable's length from the islet.

Danger reef, lying one mile N.W. ½ N. from White rock, and 1½ miles, N.E. by N. from Yellow point, the north point of Chemainos bay, covers a space of half a mile almost in the centre of the channel. A small portion of it is generally awash at high water, at which time it is difficult to make out until within a short distance of it.

Directions.—When passing through Stuart channel, there is a clear passage one mile in breadth between Danger reef and the Vancouver island shore, and going either up or down the channel, White rock kept in line with the north-east extreme of Thetis island, bearing E.S.E., leads 3 cables' lengths to the westward of the reef. Bound southward through Stuart channel from Dodd narrows, pass at from one to 2 cables' lengths eastward of Round island, and steer for the westernmost ragged tree summit of Thetis island, S.E. ¾ E., this course leads in mid-channel, and over half a mile westward from Danger reef, and White rock; when the latter bears East, alter course to S.S.E. for Stuart channel.

There is a clear passage of three-quarters of a mile in breadth between White rock and Danger reef, and of half a mile between the reef and Tree island, with a depth of over 30 fathoms. As White rock and Tree island are always visible, and Danger reef is generally above water, there can be no difficulty in either of these passages to vessels coming up Trincomalie channel.

VESUVIUS BAY, on the western side of Admiral island, immediately opposite Osborn bay, has deep water, but shoals suddenly at its head; if necessary, a vessel might anchor in 9 fathoms at $1\frac{1}{2}$ cables from the shore; but it is not recommended.

There is also anchorage for coasters inside Idol islet in Houston passage. This islet lies $1\frac{1}{8}$ miles E. by N.$\frac{1}{4}$ N. from the south end of Tent island, and is $2\frac{1}{2}$ cables from Admiral island; with the islet bearing W. by N., and midway between it and the shore, there is anchorage in 6 fathoms.

Grappler reef, on the eastern side of Houston passage, is one cable in extent and uncovers at very low water. It lies one-quarter of a mile off the north-west end of Admiral island, and half a mile S.S.W. from Southey point; there are 5 fathoms water between it and the shore of the island. Passing through Houston passage, the eastern point of Sansum narrows kept well open of the points of Admiral island to the northward of it, the latter bearing S.E. $\frac{1}{2}$ S., leads 2 cables' lengths westward of the reef, and when the southern point of Secretary island is open of Southey point bearing N.E. by N., it is cleared to the northward.

TELEGRAPH HARBOUR,* on the west side of Kuper island, is a snug anchorage, and its entrance is between Hudson island and Active point, which are half a mile apart. Entering from the southward, Escape reef (page 77) must be avoided. If passing inside the reef, the shore of the island should be kept aboard within one-quarter of a mile; if outside or westward of it, then keep Yellow point (north point of Chemainos bay) just open westward of Scott island, off Preedy harbour, bearing N.W. $\frac{1}{4}$ W., until Upright cliff of Kuper island bears N.E., when a vessel will be well to the northward of it, and may steer for the entrance of the harbour, which is free from danger (with the exception of Alarm rock, extending from the south-east point of Hudson island); 20 fathoms water will be found until 3 cables' lengths inside the entrance, when it shoals to 12 and 8 fathoms.

Anchorage.—There is good anchorage in 8 fathoms, with the north-west end of Hudson island bearing W.S.W., and Active point

* *See* Admiralty plan of Telegraph harbour, on chart No. 714; scale, $m = 3$ inches. It is high water, full and change, in Telegraph harbour at 6h. 0m; springs rise 10 feet.

S.E. ½ S.; or 2 cables' lengths farther in, in 8 fathoms, with the north-west point of Hudson island bearing S.W. by W., and Active point bearing S.S.E. ¼ E. Above this, the harbour contracts to a narrow creek extending one mile to the N.W., where coasters may find anchorage in 2 and 3 fathoms: the continuation of this creek easterly separates Kuper from Thetis island, which at low water are connected.

PREEDY HARBOUR is separated from the one just described by a group of small islands and reefs; its entrance is to the northward of them between Scott island and Crescent point of Thetis island, and is one-third of a mile in breadth. When entering, the Thetis island shore should be kept aboard to avoid False reef, a patch which covers at half tide, lying 3½ cables W. by .N. ½ N. from the west end of Scott island, and half a mile S.W. ½ S. from Crescent point.

Shoal water extends for 1½ cables off the northern sides of Scott and Dayman islands.

Anchorage will be found in 7 fathoms, with Crescent point bearing W.N.W., distant nearly half a mile, and east point of Dayman island bearing S. by W.

SWANSON CHANNEL leads from the Haro strait to the north-westward between Admiral island on the west and Pender island on the east; passing eastward of Prevost island it enters the Active pass between Galiano and Mayne islands, and thence into the strait of Georgia; northward of Active pass it connects with Trincomalie channel.

ADMIRAL ISLAND, separating Stuart from Trincomalie and Swanson channels, is of considerable extent, being nearly 15 miles in length N.W. and S.E., and varying in breadth from 2 miles at its northern end to 6 at its southern. It has two good ports, Fulford harbour on its south-east, and Ganges harbour on its eastern side. The southern portion of the island is a peninsula formed by the indentations of Fulford harbour and Burgoyne bay (a valley separating the heads of these ports), composed of a lofty ridge of mountains over 2,000 feet in height, rising abruptly from all sides; the summit, mount Bruce, being 2,329 feet high.

Immediately northward of the valley, and over Burgoyne bay on its western side, mount Baynes rises to an elevation of 1,953 feet, and is very remarkable, its southern face being a perpendicular precipice visible a long distance from the southward or eastward. The Otter range of somewhat less elevation rises northward of mount Baynes, from whence the island slopes away in a wedge shape, its northern termination, Southey point, being a sharp extreme. The island is for the most part thickly wooded, but there is a considerable extent of partially clear land both in the valley at the head of Fulford harbour and at the northern end of the

island, which has become peopled by settlers under the name of Salt Spring district, from the fact of several salt springs having been discovered.

FULFORD HARBOUR penetrates the south-east side of Admiral island in a W.N.W. direction for 2½ miles. At its entrance, is Russell island, between which and Isabella point, the western point of the harbour, is the best passage in.

Mount Baynes appears very remarkable from the harbour, rising immediately over its head almost as a perpendicular cliff. Immediately over the north side of the harbour is Reginald hill, a stony elevation between 700 and 800 feet high.

Cecil rock with 2 fathoms water on it lies one-third of a mile S.E. by E. ¾ E. from the south-west point of Russell island.

The southern entrance is two-thirds of a mile wide with a depth of 20 fathoms until abreast North rock; here the harbour narrows, and carries a general breadth almost to its head of a little less than half a mile; the depths decreasing to 13 and 10 fathoms and at 3½ cables from the head to 5 fathoms when the water shoals rapidly on the edge of the bank which extends about 3 cables from the shore at the head of the harbour.

North rock is a small rocky islet lying close off the north point of the harbour; a rock, which covers at one-quarter flood, lies 2 cables' lengths west from it, and more than 1½ cables from the shore, so that strangers entering should keep to the southward of mid-channel until past it.

The northern passage into the harbour, between Russell island and Eleanor point, though in places not more than one-quarter of a mile in breadth, is a safe channel of from 14 to 18 fathoms water.

Louisa rock, with only one fathom water on it, is the only danger; it lies 2 cables from the northern or Admiral island shore, with the west end of Russell island bearing S.E. ½ S. distant 4 cables, and North rock W.S.W. the same distance; with a leading wind the Russell island shore should be kept rather aboard.

Anchorage.—There is good anchorage in 10 fathoms in the centre of the harbour with Reginald hill bearing E.N.E.; at the head of the harbour is a considerable fresh-water stream, from which shoal water extends for 3 cables' lengths.

GANGES HARBOUR is a safe and commodious port for vessels of any description or size, and has two entrances. Its southern entrance, which is in the Swanson channel, lies between Admiral and Prevost islands, and has no dangers which are not visible; the northern entrance is by Captain passage. When entering from the southward, the Channel islets

may be passed on either side, but by far the widest passage is to the northward of them; they are two small wooded islands, 1½ miles within Beaver point, and 2 cables from the shore of Admiral island.

Liddell point, the south-east extreme of Prevost island, and the northern entrance point of the harbour, has a reef which is covered at half flood extending 2 cables' lengths eastward from it.

The Acland islands, two in number, lie to the westward of Liddell point along the shore of Prevost island, between which and them there is no ship channel.

Directions.—The fair channel into the harbour, between the Channel and Acland islands, is nearly half a mile wide, the depth being 30 fathoms; having passed these islands the harbour is nearly 1½ miles wide, and the general depth for 2 miles, is from 20 to 13 fathoms.

There are but few dangers in working into the harbour, and they are easily avoided. A rocky patch with one fathom water on it lies 2¾ cables W. ¼ N. from the west point of the westernmost Acland island, and the same distance off shore. There is another one-fathom patch which is more in the track of vessels; it lies nearly 2 miles W. by N. ½ N. from the southernmost Channel islet, nearly 1½ miles S. by E. ¼ E. from Nose point (Captain passage), and is half a mile from the southern or Admiral island side of the harbour; there is a clear passage 3 cables wide, the depth being 14 fathoms, southward of the patch; to the northward of it the passage is three-quarters of a mile wide, with depths of from 13 to 21 fathoms.

The Chain islands are a group of 6 or 7 low narrow islets connected by reefs, extending from the head of the harbour in an E.S.E. direction for 1½ miles. To the southward of these islands the ground is clear, but to the northward of them are scattered reefs, and vessels are not recommended to anchor on that side above the outermost island.

Anchorage.—A vessel may anchor as soon as a depth of 10 or 12 fathoms is found; a good berth is in 11 fathoms water with Peile point, and the two entrance points of Long harbour nearly in line bearing N.E. by N., and the easternmost Chain island W.N.W. If desirable, anchorage may be had in 6 fathoms mud, midway between the Chain islands and the south shore, the easternmost island bearing E.N.E., or in a still snugger berth one mile above, off the sandy spit on Admiral island, in 4 or 5 fathoms. This latter berth is recommended for vessels of moderate size intending to make any stay.

CAPTAIN PASSAGE also leads into Ganges harbour, to the northward of Prevost island. It is a clear deep passage, one-third of a mile wide, with depths of from 30 to 40 fathoms; and vessels from the

northward intending to enter the harbour should always use it. There is only one danger, which is well inside Ganges harbour, and which is almost equally in the track of vessels working up by the southern passage; it is a small patch of 2 fathoms lying 3½ cables S.W. by W. from the western entrance point of Long harbour. Entering by Captain passage, Peile point should not be shut in by the entrance points of Long harbour until the opening between Prevost and Acland islands is shut in, when this reef will be well cleared. When working up by the southern channel, a vessel should not stand so far to the eastward, when in the neighbourhood of this patch, as to open out the passage between Acland and Prevost islands.

LONG HARBOUR may be almost considered as part of Ganges harbour. It is a long, narrow creek, its general breadth being 2 to 3 cables, and it lies to the eastward of Ganges harbour and runs parallel to it for 2½ miles. Its entrance is between two sloping, rocky points, similar to each other, on the west side of Captain passage. At one-quarter of a mile inside the entrance is a high, bare islet, which must be passed on its south side; and at one mile inside the entrance there is also another and somewhat similar island, which may be passed on either side. Outside these islets the depth is from 14 to 16 fathoms; above them, 4 and 5 fathoms. At the head of the creek is a snug place for a ship to repair, &c., but as a harbour, it is only adapted to steamers or coasters, and, with the good and easy anchorage of Ganges harbour so close, there would appear to be no reason to recommend this contracted and inconvenient one.

PREVOST ISLAND, lying in the centre of Swanson channel, is moderately high, thickly wooded, and of an irregular shape. It is 3 miles long, in a N.W. and S.E. direction, 1¼ miles in breadth, and on its southern and western sides it is indented by several bays and creeks; its northern side is almost a straight cliffy shore.

Ellen bay, on the south-east side of Prevost island, between Liddell and Red islet points, is three-quarters of a mile deep, by one-third in breadth, narrowing to 2 cables, one-third of a mile from its head, and affords fair anchorage with all but south-easterly winds in 10 fathoms, mud bottom. The head of this bay is a grassy, swampy flat, only one cable wide, separating the bay from the creeks on the western shore.

Annette and Glenthorne creeks, on the western or Ganges harbour side, are curious, narrow indentations extending into the island for one mile in an E. by S. direction, and only separated from each other by a narrow stony ridge. In Glenthorne, the western one, there are 3 fathoms water, the other has 1½ fathoms; they are snug places for small craft, or for a vessel to repair.

James bay, on the north-west side of the island, and on east side of Captain passage, affords fair, but very confined anchorage in 10 fathoms for a vessel of moderate size, sheltered from southerly winds, but she must get well in, as there are 18 to 20 fathoms water in the outer part of the bay.

There are two bays northward of Ellen bay, but too small to afford any shelter.

Hawkins island, a small, rocky islet with a few bushes on it, lies close off a remarkable white shell-beach, on the north-east side of Prevost island.

Charles rocks.—From 2 to 3½ cables W. ¼ N. from the north-western point of Hawkins island are the Charles rocks, three smooth-topped rocks, not marked by kelp, and uncovering towards low water.

ACTIVE PASS.—From Discovery island at the southern entrance of Haro channel, to the sand heads of Fraser river, by the Active pass, is just 40 miles, and the line is almost a straight one. By adopting this route, not only the most dangerous and inconvenient part of the Haro strait is avoided, viz., its northern entrance abreast the East point of Saturna island and Patos island (where the tides are strong and apt to set a vessel down Rosario strait, or over on the eastern shore,) but a distance of nearly 10 miles is saved.

From Portlock point, the south-eastern bluff of Prevost island, the entrance of Active pass bears N. by W. ½ W. 1¾ miles. The southern entrance point of the pass, Helen point, is low, bare, and of a yellowish colour; over its northern side rise the high, stony hills, on the southern side of Galiano island; the entrance itself does not become very apparent until it is approached within one mile.

Active pass takes an E.N.E. direction for 1½ miles, and then turns north for the same distance, fairly into the strait of Georgia. The average breadth of the channel is about one-third of a mile, and its general depth about 20 fathoms; there are no hidden dangers with the exception of a small rock off Laura point, on which there is said to be a depth of only a few feet, and which should, therefore, not be closely approached*; and at one-quarter of a mile within the southern entrance, and very close off the northern shore, a rock which uncovers at half tide; but the great strength of the tides, together with the absence of steady winds, renders it unfit for sailing vessels, unless,

* H.M.S. *Termagant* passing through Active pass in July 1860, ran on to Laura point, on the south side, from refusing to answer her helm in making the turn to the northward, the tide at the time favourable, and running about 4 knots; H.M.S. *Plumper* and *Alert* were ahead and astern of her at the time. The *Termagant's* draught was 18 feet, and she sat 5 feet by the stern; an under-current striking her heel was probably the cause.

indeed, small coasters; for steamers it is an excellent channel, and a vessel of moderate size commanding a speed of 8 knots may take it at any time without fear, but it is advisable for large ships and those deeply laden to pass through at, or near slack water.*

LIGHT.—From a square, white, wooden, light tower, situated on Georgina point, is exhibited at an elevation of 55 feet above high water, a *fixed* white light, visible between the bearings of N.E. ¼ N., through south, to W. ¼ S., and should be seen in clear weather from a distance of 12 miles.†

The lighthouse is situated in latitude 48° 52′ 40″ N., longitude 123° 17′ 50″ W.

Otter bay.—If overtaken by night, or waiting for tide, Otter bay, on the west side of Pender island, is a good stopping-place; it is one mile north from Mouatt point, and 2¾ miles E.N.E. from the Channel islets in Ganges harbour; a very fair anchorage is to be had in the centre of the bay, in 8 fathoms, and no dangers. Ellen bay in Prevost island might also be used, but the former is to be preferred.

Miners bay, on the south side of Active pass, where it takes the sharp turn to the northward, affords anchorage, if necessary; but a vessel must go close in to get 12 fathoms, and then is barely out of the whirl of the tide.

Directions.—After entering Swanson channel (page 80) between Admiral and Pender islands steer to pass to the eastward of Prevost island, and keep Pelorus point (the eastern extreme of Moresby island) open of Mouatt point (the western extreme of Pender island) bearing S.E. ¼ S.,‡ which will lead over one-third of a mile westward of Enterprise reef (two dangerous patches which lie off the west side of Mayne island, *see* p. 56); and when Helen point bears N. by E., or the northern beacon comes well open west of the southern one, the reef will be cleared, and the entrance

* Since the mishap to H.M.S. *Termagant*, seven vessels have met with accidents in Active pass; and no ship, especially those deeply laden, should attempt it except near slack water. There are three separate and distinct places in the channel where large vessels will take charge against their helm in spite of all precautions, should they happen to be at those places at certain times of tide.—Mr. John Devereux, 1886.

H.M.S. *Triumph*, when going through Active pass, with a flood tide, running at the rate of from 4 to 5 knots an hour, experienced an under current setting in the opposite direction. It is therefore dangerous for vessels of heavy draught to attempt the passage at the full strength of the tide.—Captain H. Rose, R.N., H.M.S. *Triumph*, August 1886.

† A bell is sounded, during thick or foggy weather, *once* every *fifteen seconds*. The fog-signal station is a wooden building, painted *white*, situated on the western extreme of Georgina point, and about 40 feet from the lighthouse.

‡ *See* View C on Admiralty chart:—Haro strait and Middle channel, No. 2,840; scale, *m*=1·0 inch.

of the pass may be steered for. There is a passage inside Enterprise reef which may be taken when both kelp patches can be seen. If coming out of Navy channel, between Pender and Mayne islands, a vessel should keep over for Prevost island until Pelorus point is open of Mouatt point; these two points in line, or just touching, lead very close on Enterprise reef. On the western side of Swanson channel, the reef which lies 2 cables eastward from Liddell point must be avoided, and Red and Bright islands, off the points to the northward of it, should be given a berth of one cable.

When passing through Active pass to the westward against the flood, a vessel should keep rather on the southern shore of the pass, as the tide sets over towards a rock, which uncovers at half tide, and lies very close to the northern shore, about one-quarter of a mile within the southern entrance.

When entering or passing out of the northern entrance of Active pass, the point of Gossip island, on the west, and also Georgina point (north extreme of Mayne island) on the east, should be given a good berth; indeed, the best directions which can be given are to pass through in mid-channel. From thence the sand heads of Fraser river bear N. by W. $\frac{3}{4}$ W. distant 11 miles. The sand head buoys are visible from a distance of 2 or 3 miles.

Tides.—The flood-tide in Active pass sets from west to east, or from the Swanson channel into the strait of Georgia; and the ebb, in the contrary direction.*

The velocity during springs is sometimes 7 knots; at ordinary tides, from 3 to 5. In the northern entrance there is sometimes a heavy tide ripple, caused by a patch of 7 and 9 fathoms, and by the meeting of the tide through the pass with that in the strait; it is recommended to pass through in mid-channel; no favourable eddy, or less strength of tide, will be found on either side, unless inside the kelp which lines the shores. It is high water, full and change, at 4h. 0m.

TRINCOMALIE CHANNEL commences at Active pass, from the southern entrance of which its general direction is W.N.W. for 24 miles, when it enters the Dodd narrows.

Like all the inner channels already described, this one must be classed as essentially a channel for steamers or coasters; it can only be used with advantage by vessels bound to the eastern ports of Vancouver island below Nanaimo, or by such as choose to enter Nanaimo itself by that contracted pass the Dodd narrows.

The eastern side of the channel is formed by the long narrow islands of Galiano and Valdes, and the western by Admiral, Kuper, and Thetis islands, and part of the eastern shore of Vancouver, the main island; some

* The time of high water at Active pass is one hour later than that at port Townshend, Admiralty inlet.—Captain H. Rose, R.N., H.M.S. *Triumph*, August 1886.

smaller islands are scattered over it, and there are also several rocks which require to be known and avoided, nevertheless, with the assistance of the chart, and these directions, it is a desirable and safe channel for the class of vessels before mentioned; the general depth of water is not inconvenient for anchorage if necessary, as it rarely exceeds 30 fathoms, and from 12 to 18 fathoms can generally be found at a convenient distance from the shore. Montague harbour on the western side of Galiano island is a good stopping place, also Clam bay on the east side of Thetis island.

Trincomalie channel contracts when abreast Narrow island to less than one mile in width, but the shores are bold on both sides. On the shore of Galiano island, one mile N.E. from the south-east point of Narrow island, is Retreat cove, offering shelter for boats or anchorage for coasters; an island lies in the centre of it.

Portier and Gabriola passes, leading into the strait of Georgia, are both intricate and dangerous, unless to those perfectly acquainted with them, and the tides are so strong, and varying in their set, that they cannot be said to be applicable to the general purposes of navigation, and few vessels would be justified in using them unless in cases of emergency (*see* pages 90, 95).

MONTAGUE HARBOUR is formed between the south-west side of Galiano island and Parker island, and its entrance, between Phillimore point and the small island of Julia, is $1\frac{3}{4}$ miles W.N.W. from the west entrance of Active pass. The entrance is but little over one cable in breadth, but has deep water, and is free from danger; immediately inside the points it widens out to one-quarter of a mile, and anchorage may be obtained in 8 to 10 fathoms in the arm which leads to the harbour. This arm runs in a N.W. $\frac{1}{2}$ W. direction for nearly one mile, with an average breadth of 2 cables and a depth of from 7 to 11 fathoms, when it turns to the eastward and enters the harbour, which though small is a snug and secure anchorage, with a general depth of 6 fathoms, good holding ground; several Indian lodges are built on the shores of the bay. There is a narrow passage to the north-westward from this harbour into the Trincomalie channel, the least depth in which is 3 fathoms at low water.

Several smaller islands extend W.N.W. from Parker island, viz., Sphinx, Charles, Wise, and Twin islands,* the latter are two rather remarkable rocky islets about 30 feet high; between this group and the shore of Galiano island is a passage of over half a mile in breadth with good anchorage in 10 fathoms.

Atkins reef lies on the western side of Trincomalie channel, one-third of a mile from the shore of Admiral island, and in the track of vessels working up or down. It is one cable in extent, and covers at 4 feet rise

* Mr. John Devereux reports, that a rock which uncovers at low water spring tides, lies 2 cables W. by N. $\frac{1}{2}$ N., from Twin islands.

of tide, its neighbourhood being marked by kelp, which, however, is rarely seen when there is any ripple on the water. The reef lies 3⅛ miles W. by N. ½ N. from Peile point, the north-west end of Prevost island; 1½ miles S. ½ E. from the Twin islands; and one mile E. by S. from the south-east end of the peninsula which forms Walker hook. There is a passage of 16 fathoms between the reef and Admiral island, and it may be passed at one cable's length on the outside. The south-west abrupt tangent of Galiano island in line with mount Parke, a remarkable bare-topped conical hill on the south side of Active pass, bearing E. ¼ S., leads well outside Atkins reef.*

WALKER HOOK is formed by a peninsula or tongue of land projecting from Admiral island, 4 miles W. by N. ¾ N. from Captain passage. On its south-east side is fair anchorage for small vessels in 6 fathoms, but a shoal patch marked by kelp, one-third of a mile in extent, lies from 2 cables to over half a mile E.N.E. from the south-east point of the peninsula; small vessels may pass between this shoal and the point in 5 fathoms, or between it and Atkins reef, which is better, and anchor in 6 fathoms, 2 cables southward from the neck of the peninsula. There is also anchorage in 10 fathoms northward of the peninsula, but a vessel must not go within the north point of the tongue of land forming the hook as it dries a long way out.

Governor rock, a dangerous rocky patch lying almost in the centre of Trincomalie channel, has 4 feet on it at low water, is about half a cable in extent, and though kelp grows on it, yet it is very difficult to make out until quite close to. It lies 1⅞ miles W. ¾ S. from Twin islands; 1½ miles N.W. by N. from the south-east point of Walker hook; and 1¾ miles S.S.W. from Quadra hill. This hill cannot be mistaken; it rises from the centre of Galiano island to the height of 750 feet, and a remarkable white basaltic cliff will be seen on the coast immediately southward of it.

Walker rock lies two-thirds of a mile North from Governor rock, and covers at 4 feet rise. It lies 1⅞ miles W. by N. ½ N. from Twin islands; 1⅛ miles S.W. by S. from Quadra hill; and two-thirds of a mile from the shore of Galiano island.

A beacon of stone, 8 feet high, surmounted by a staff 18 feet high, with cross pieces at right angles, painted black on east and west sides and white on north and south, is erected on the Walker rock.

These two rocks are the principal dangers to be avoided in the southern part of Trincomalie channel; they are both steep-to, and may be passed if necessary at one cable's length.

* *See* View C on Admiralty chart:—Haro and Rosario straits, No. 2,689; scale, $m = 0{\cdot}5$ inches.

Directions.—When passing up or down Trincomalie channel, vessels may either take the passage southward of Governor rock, or that between it and Walker rock, or northward of the latter. If taking the southern passage, after having cleared Atkins reef, and the shoal off Walker hook; the shore of Admiral island, which is bold, should be kept aboard within half a mile, until Quadra hill bears N.E., when they will be to the westward of both rocks, and may steer N.N.W. over towards Galiano island, giving the south-east end of Narrow island a berth of at least half a mile, as a reef extends off it.

If passing between the two rocks, which are two-thirds of a mile apart, the marks for a mid-channel course are, the north-east point of Thetis island kept well open of the east side of Narrow island, the latter bearing W. by N. ½ N.; steer up with these marks on until Quadra hill bears N.E. when both rocks will be passed, taking care not to open the north-east point of Thetis island so much of Narrow island as to bring the former in line with Hall island, as this would lead right on to the Walker rock. The north-east point of Thetis island should be kept just halfway between the east side of Narrow, and west side of Hall islands;* these marks are very clear and well defined, and are generally seen from a long distance. When passing to the eastward; when the south-east point of Walker hook bears South, a vessel will be over half a mile eastward of Governor and Walker rocks.

If passing northward of Walker rock when bound westward up the channel, keep Parker and Wise islands aboard within half a mile; there are no dangers off them. When abreast Twin islands, which should not be passed within 3 cables' lengths, haul in to the northward until mount Sutil on the southern end of Galiano island is well open northward of Twin islands, or until the same mountain is in line with Charles island bearing E. by S. ¼ S.; steer up with these marks on astern (which will lead well to the northward of Walker rock) until Quadra hill bears N.E., when a mid-channel course may be steered between Galiano island, and the islands forming the western side of the channel.

Coming down Trincomalie channel, and desiring to pass northward of Walker rock, keep over on the Galiano island shore until the north-east point of Thetis island is shut in by the south point of Hall island; as long as these points are not opened a vessel will be northward of the rock, and when Quadra hill bears North, she will be half a mile eastward of both it and the Governor rock.

HOUSTON PASSAGE, between Kuper island and the north end of Admiral island, leads from the Trincomalie into Stuart channel. Vessels

* *See* View D on Admiralty chart:—Haro and Rosario straits, No. 2,689; scale $m = 0{\cdot}5$ inches.

intending to take it had better pass up southward or inside the Governor rock. The entrance is between the north-east point of Admiral island and Narrow and Secretary islands; the west side of Narrow island is foul, several small islets and rocks extend from one to 3 cables' lengths off it; at 1¾ miles E. by S. from Southey point, a bank having from 2 to 3 fathoms water on it, extends one-third of a mile off the shore of Admiral island, narrowing the navigable channel between that island and Narrow island to one-third of a mile in breadth; the general depth of water in mid-channel is 20 fathoms, and anchorage within a moderate distance of the shore of Admiral island may be obtained in 10 or 12 fathoms water, off Saltspring settlement, at 2¼ miles E. by S. from Southey point.

Southey point, the sharp northern extreme of Admiral island, may be approached to within one cable's length. At half a mile S.S.W. from it, is the Grappler reef described on page 79; round it Houston passage turns abruptly to the southward, and Stuart channel may be entered either by the main passage between North reef and Admiral island, or if necessary, between North reef and Tent island. Give North reef a moderate berth, as a shoal ridge of rocks extends one-third of a mile off its north-west and south-west ends (page 77).

PORTIER PASS, between Galiano and Valdes islands, is the first outlet into the strait of Georgia, northward of Active pass, from which it is distant 14 miles; the pass, though short (not exceeding one mile from its southern entrance until fairly in the strait) is narrow, and is rendered still more so by sunken rocks on its western side; the tides are very strong, running from 4 to 7 knots, and overfalls and whirling eddies are always to be met in the northern entrance. No vessel but a steamer commanding a speed of 8 knots should take it unless in a case of emergency.

Black rock, the first danger in the southern entrance, is just awash at high water; it is on the western side of the pass 1⅛ cables E.S.E. from Native point, the north-west entrance point, and is easily avoided.

Virago rock, the principal danger, is almost in the centre of the channel, but rather on the western side; it only uncovers at low tides, and lies 2 cables E. by N. ½ N. from Native point, and a little over 2 cables W. by S. ½ S. from Race point, the centre projecting point on the east side of the pass, here is the narrowest part of the passage.

Two-fathom patch.—The third danger is a 2-fathom rocky patch, extending from one of the outer east points of the pass; it lies one-third of a mile N.N.E. ¼ E. from Race point, and 3 cables W. by N. ¾ N. from Tongue point, the outer east point; this patch is covered with kelp, which is generally visible.

DIRECTIONS.—At any stage of the flood stream a steam vessel acquainted with the channel might pass out into the strait of Georgia with facility; the eastern shore should be always kept aboard within one cable's length until beyond Race point, which should be passed close to, after which a vessel with the flood stream should steer for Canoe islet, a bare yellow rock about 20 feet high, bearing N.N.W. two-thirds of a mile distant, in order to clear the 2-fathom patch; Canoe islet is clear of danger on its western side, but its eastern should not be approached within 3 cables' lengths.

When passing out of the channel with the ebb tide, the great danger to be avoided is the violence of the stream setting against and round Race point, which, if a vessel have not sufficient power to stem, will either take her on the port bow and set her on the point, or, which is still more probable, on the starboard, and set her on Virago rock.*

Entering Trincomalie channel from the strait of Georgia by Portier pass, a vessel should keep one-third of a mile eastward of Canoe islet, and then steer for Race point, due allowance being made with the flood for the 2-fathom patch; if with the ebb, Race point should be kept close aboard to avoid being set on Virago rock, and having passed the point, hug the eastern shore, which is clear of danger; the rule on all occasions should be to avoid the western shore; the great strength of the tide ceases immediately on clearing the entrance points either way. From the strait of Georgia the pass is always easily recognized from a distance of several miles, by the gap, formed by its sloping wooded entrance points terminating in two low extremes, from most points of view overlapping each other; bring the entrance to bear about S. by W. and steer for it.

Tides.—The flood tide sets from Trincomalie channel to the northward into the strait of Georgia and the ebb in the contrary direction. The ebb stream commences from one hour to one hour and a half before it is high water by the shore, and runs for one hour after low water, or from 7 to 8 hours; it is high water at full and change at about 4 p.m., but it is not very regular. At springs the tides run with a velocity of 4 to 7 knots with dangerous whirls and eddies.

CLAM BAY,† on the east side of Thetis and Kuper islands, opposite to Portier pass, is formed by the shores of these two islands approaching each other; and the continuation of the bay separates these two islands at high water, when there is a boat channel into Telegraph harbour (page 80) on their western side.

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* This was the case on one occasion with H.M. steam vessel of that name.

† *See* Admiralty plan of Clam bay, on chart, No. 714; scale, $m = 3$ inches.

White Spit, a remarkable point of broken clam shells which can be seen from a long distance, forms the southern entrance point of the bay; immediately southward of it is a considerable native lodge; a reef, having less than one fathom water on it in some places, extends over 3 cables lengths in an E.S.E. direction from White spit point; Leech island off the northern point of the bay is a small wooded islet.

Centre reef, with 6 feet water on it, and marked by kelp, should not be approached nearer than 1¼ cables, it lies almost in the centre of the entrance, nearly 3 cables N.W. ½ W. from White spit, and one-third of a mile E. by S. from Leech island.

Rocket shoal, on which there is only a depth of 6 feet at low water spring tides, lies nearly in the centre of the bay, with White spit extreme in line with the highest part of Indian island, bearing E. ¼ S., it is half a cable in extent, with depths of from 2 to 4 fathoms around it.

Directions.—The best passage into Clam bay from the eastward, is northward of Narrow, Secretary, and Indian islands, between them and Hall island; after passing Indian island steer in for White spit on a S.W. bearing, giving it a berth of one cable.

If desired, vessels may enter southward of Narrow and Secretary islands, between them and Kuper island, and there is fair anchorage in a moderate depth of water in this passage; there are, however, several dangers in this channel, described on page 90, also two rocks marked by kelp with less than one fathom water on them off the south-west side of Indian island, to be avoided; the southern lies 4 cables S.W. ½ W. from the south end of Indian island, and the northern 1½ cables S.W. from the north end of the same island; therefore the west side of Indian island should be kept aboard and a vessel should not bear up round White spit until its extreme [illegible] W., as rocks extend off more than 3 cables' lengths E.S.E. from it [illegible] nnel is not recommended unless for small vessels acquainted with the locality.

Entering from the northward there is a clear deep passage of two-thirds of a mile in breadth between Thetis and Reid islands.

Anchorage may be had in Clam bay in 6 fathoms water between Rocket shoal and the shore.

Rose islets, five small rocky islets, the northernmost about 20 feet high with a few bushes on it, lies half a mile westward from the north end of Reid island, but with no ship passage between. Vessels bound to Clam bay from the northward should pass westward of these islets.

Yellow Cliff Anchorage.—There is fair anchorage on the western side of Valdes island, 2 miles above Portier pass, immediately off

a yellow cliff; 8 fathoms, sandy bottom, will be found with the cliff bearing N.W. by N. distant one quarter of a mile.

It will also be known by Shingle point, a low projection with a native village on its extreme, one-third of a mile W. by N. from the yellow cliff.

DODD NARROWS may be said to commence above Round island (page 78), although the narrowest part is one mile distant from it. To small vessels or steamers of moderate length and sufficient power, that answer their helm quickly, this narrow pass offers no dangers. The strength of the tide at its greatest rush is over 8 knots, the least depth of water 7 fathoms, and the narrowest part of the channel is 80 yards wide; but this is for a short distance, and the pass being nearly straight, a vessel is carried through in a few moments. Vessels should, however, only pass through at or nearly the time of slack water. The ebb stream sets across the northern entrance to the Narrows.

Percy and Round island anchorage.—If bound through Dodd narrows from the southward, and having to wait for slack tide, there is fair anchorage with but little tide, westward of Round island in 6 fathoms, midway between it and the shore.

Percy anchorage on the north side of the Narrows, between Gabriola and Mudge islands, is a convenient place to wait for the tide.

Mudge island separates Dodd narrows from the False ones.

Directions.—When proceeding for Dodd narrows from abreast Portier pass, the mid-channel course is W.N.W. for about 3 miles, or until Ragged island and Reef point of Thetis island are in line bearing S.W. by S.

The most direct course is northward of Danger reef, between it and Tree island; the latter is a small round wooded islet lying off the south end of De Courcy islands; this passage is two-thirds of a mile wide, with depths of from 25 to 30 fathoms.

Danger reef (page 78) consists of two rocky patches one cable's length apart, the eastern of which is generally awash, and it should not be approached within one-third of a mile; if the reef should not be seen it is recommended to pass one-quarter of a mile to the southward from Tree island; there is deep water between it and De Courcy islands.

The passage between White rock and Danger reef is likewise a very good one; it is half a mile wide, with depths of from 20 to 30 fathoms. White rock is 15 feet high, and may be passed if necessary on either side at the distance of 2½ cables. When the passage between Tree island and the south point of De Courcy islands is open, the former bearing E.N.E., a vessel will be northward of Danger reef, when a mid-channel course

for Dodd narrows is N.W. by W. and the distance 5 miles; Round island at their entrance should be seen ahead.

When passing up, keep on the eastern side of Round island at a convenient distance; the only directions necessary after this are to keep in mid-channel, and to attend the steerage quickly and carefully. When through the Narrows the strength of the tide ceases, and a vessel will be in Northumberland channel, a fine wide passage leading to, and only 5 miles from, the anchorage at Nanaimo.

When taking the Narrows from the northward, be careful not to mistake the False Narrows, on the northern side of Northumberland channel (page 149); they are much wider than the real pass, but nearly dry at low water. The Dodd narrows are not so easy to pass through from the north as from the south, as in the former a slight bend that has to be made must be made immediately on entering the narrow part. The tides should be studied in passing either way. Vessels should not attempt it with the full rush of the stream; an hour before or after low water there is no difficulty to a steam vessel.

Anchorage.—A convenient stopping place on the south side of the Narrows to await the tide is, westward of Round island.

On the north side of the Narrows, temporary anchorage may be taken up on the north shore off Mudge island.

Tides.—It is high water in Dodd Narrows at full and change at 3h. 30m. p.m., and low water at 9h. 30m. a.m., and at that period the flood stream commences at low water and runs about 7 hours. The first of the flood is the best time to pass the Narrows. Vessels leaving Nanaimo and intending to pass down, should be at the Narrows an hour before high or low water, as the tides are nearly an hour earlier there.

PYLADES CHANNEL.—The De Courcy islands are a group extending 4½ miles in an E.S.E. direction from Mudge island, which separates the False from Dodd narrows, and on the northern side of the group, between them and Valdes island, is Pylades channel, which leads by the Gabriola pass into the strait of Georgia, as well as to the entrance of the False narrows. The channel has an average breadth of one mile, with a depth of 35 fathoms, and at its head, near the entrance to the False narrows, is good anchorage in 9 fathoms, convenient for vessels intending to take the Gabriola pass and waiting for the tide.

False narrows are full of kelp, and shoal at low water, affording only a boat passage into Northumberland channel. The passages between the De Courcy islands are deep and navigable; Ruxton passage between the north and middle islands is half a mile wide, and free from danger; the

narrow pass between the middle and south island is scarcely one cable wide, but has a depth of 5 fathoms.

GABRIOLA PASS, between the south end of Gabriola island and the north end of Valdes island, is not recommended, unless for coasting vessels knowing the locality, or steamers, if necessary, for it is a narrow and intricate channel, something of the same character as Dodd narrows, except that it is a much longer reach. Its direction is E.N.E. for little over one mile, its narrowest part is not over 250 yards in breadth, and the shoalest water is 6 fathoms.

An island nearly one mile long in a N.N.W. and S.S.E. direction, lies over half a mile N.E. by E. from the narrow eastern entrance of the pass, shoal water extends one-third of a mile E.S.E. from the south-east end of the island; the channel from the pass into the strait of Georgia is between the south-west side of this island, and a narrow ridge of low wooded islands on the west side, off which a chain of covering rocks marked by kelp, extends nearly 2 cables' lengths to the eastward.

Directions.—Proceeding through the pass into the strait of Georgia; when nearly half a mile E.N.E. from the narrows, steer S.E. by E. ½ E. for three-quarters of a mile, when alter course to the eastward; if bound to the northward, the Gabriola reefs, bearing N. by E., distant from one to 2½ miles must be avoided. These latter are an extensive group of rocks covering a space of nearly 1½ miles in a N.N.E. direction, uncovering at low water, and lying 1½ miles, eastward from the Flat Top islands; much broken ground exists in their neighbourhood, and it is desirable to give them a good berth (*see* page 142).

There is also a passage in a northerly direction, from the pass into the strait, between the east extreme of Gabriola, and the islands off it, but it is not recommended.

Telegraph.—Overhead telegraph wires are stretched across Gabriola pass; vessels having masts over 30 feet high, should not attempt to pass under the wires.

The shore end of the telegraph cable laid from Point Grey (connecting Vancouver island with the mainland) is landed at Valdes island, 2½ miles south-east of Gabriola pass. Wires are thence carried to Nanaimo and Victoria.

Tides.—The tides in Gabriola pass run from 5 to 6 knots.

CHAPTER III.

MIDDLE CHANNEL.—LOPEZ SOUND.—ORCAS WEST AND EAST SOUNDS.

Variation from 23° 0′ to 23° 10′ East in 1888.

The MIDDLE CHANNEL* is the centre of the three passages leading from the strait of Fuca into that of Georgia, and is bounded by San Juan island on the west, and the islands of Lopez, Shaw, and Orcas on the east. Although a deep navigable ship channel, and eligible for steamers of the largest size, the southern entrance is somewhat confined, and subject to strong tides, with a general absence of steady winds; the wide straits of Rosario and Haro, on either side of it, are therefore far to be preferred for sailing vessels above the size of coasters.

The general direction of the channel is N.N.W. for 5 miles, when it trends to the W.N.W. for 7 miles to its junction with Douglas channel. The southern entrance lies between the south-east point of San Juan and the south-west point of Lopez island; for 1½ miles its direction is N.N.W., and the breadth of the passage for this distance varies from two-thirds of a mile to 4 cables' lengths; abreast Goose island on the western side, it does not exceed the latter breadth. When entering, the danger to be avoided on the western side is the Salmon bank, extending southerly from San Juan; and on the eastern the Whale rocks, always out of water. The tides in this entrance set from 3 to 6 knots an hour, with eddies and confused ripplings; when within the entrance, there is far less tide, and Griffin bay, offering good anchorage, is easily reached.

Salmon bank extends 1½ miles south from Cattle point, the south-east extreme of San Juan island, a bare point about 50 feet high, the sloping termination of mount Finlayson, and the least depth of water found on it is 10 feet, with rocky patches, marked in summer by kelp; depths varying from 4 to 9 fathoms extend for a further distance of three-quarters of a mile in the same direction.

Whale rocks, on the eastern side of the entrance, are two black rocks one cable's length apart, and 3 or 4 feet above high water; a patch

* *See* Admiralty chart:—Haro strait and Middle channel, No. 2,840; scale, $m = 1{\cdot}0$ inch; also Haro and Rosario straits, No. 2,689; scale, $m = 0{\cdot}5$ inches.

on which kelp grows, with one fathom water on it, extends 2 cables' lengths S.S.E. from them, otherwise they are steep-to, but it is not recommended to pass them nearer than one quarter of a mile, as the tides set strongly over them.

Directions.*—Entering Middle channel from the westward or southward, Cattle point should be given a berth of at least $1\frac{3}{4}$ miles. Mount Erie, a remarkable summit on Fidalgo island 1,250 feet high, in line with Jennis point bearing N.E. by E. $\frac{1}{4}$ E. leads $1\frac{1}{4}$ miles south of Salmon bank in 13 fathoms; when the entrance to the channel is open, bearing N.N.W., or when Goose island, a small islet on the western side of the entrance, is in line with Orcas Nob bearing N.N.W. $\frac{1}{2}$ W., a vessel will be well to the eastward of the bank, and may steer in for the passage.† Orcas Nob is a remarkable conical hill, with a bare stony summit, 1,104 feet above the sea, rising over the west side of Orcas island.

The bottom in the channel is rocky and irregular, varying in depth from 18 to 60 fathoms, causing overfalls and eddies which are apt to turn a ship off her course unless the helm be given quickly to meet them; but there are no positive dangers after passing the Salmon bank: between this bank and Cattle point there is a passage carrying $3\frac{1}{2}$ fathoms, one-third of a mile in breadth; 5 fathoms will be found within one cable's length of the point. The westernmost Whale rock seen in the centre of the channel between Charles island and the north side of Mackaye harbour leads through the middle of this narrow channel, which, however, is not recommended.

GRIFFIN BAY‡ is an extensive indentation on the eastern side of San Juan, immediately within the southern entrance of Middle channel. Although so spacious, yet from the great depth of water there is but a limited portion of the bay available for anchorage, and this is in the southern angle, immediately off the remarkable prairie land between two forests of pine trees.

With all westerly or southerly winds Griffin bay affords good shelter; but with those from North or N.E. it is considerably exposed, and landing is difficult in consequence of the long flat which extends off the beach. These winds, however, are not of frequent occurrence.

Half-tide rock, just awash at high water, lies $1\frac{1}{3}$ miles W. $\frac{1}{4}$ N., from Harbour rock, and 4 cables from the western shore of the bay.

* *See* Admiralty chart:—Griffin bay, No. 611; scale, m = 3·0 inch.

† *See* Views A. and B. on Admiralty chart:—Haro strait and Middle channel, No. 2,840; scale, m = 1·0 inch.

‡ *See* Admiralty plan of Griffin bay and adjacent anchorages, No. 611; scale, m = 3·0 inches.

There is another rock which covers at one-quarter flood, lying 4½ cables S.E. ½ S. from Half-tide rock, and one-third of a mile N. ½ W. from the pier on the beach.

Directions.—Entering by the southern passage, Harbour rock on the western side, nearly one mile within Goose island, may be passed at one cable's length, keeping outside the kelp, which extends some distance off it; from one cable's length off Harbour rock to the anchorage is W.S.W., two-thirds of a mile.

Anchorage.—The best anchorage is in 9 fathoms, mud bottom, with the southernmost of the white cliffs on Lopez island on the eastern side of the channel, kept well open of Harbour rock, bearing E. by N. ½ N., and the black rocky extreme of Low point just open northward of Half-tide rock, bearing W.N.W., the rock distant half a mile; from this position the water shoals rapidly towards the shore, and at 1½ cables nearer in there are only 3 fathoms; a stranger should drop an anchor directly 12 fathoms is obtained.

NORTH BAY, in the north-west angle of Griffin bay, immediately under Park hill (a bare grassy eminence about 180 feet high), affords good anchorage in from 4 to 10 fathoms, mud bottom, with all winds but those from S.E., to which it is somewhat exposed. The bottom here is more regular than in Griffin bay, and altogether it is perhaps a snugger anchorage, though less convenient to shipping, being 3 miles from the settlement.

Anchorage.—Anchor in from 6 to 9 fathoms, mud bottom, with the east point of Dinner island bearing S.S.E. ½ E., distant 4 cables, and the south-east point under Park hill bearing E.N.E.

Tides.—The greatest rise and fall at the southern entrance of Middle channel at full and change is 12 feet; but little stream is felt at the anchorages. With the flood an eddy, of about one knot an hour, sets to the southward in Griffin bay, and with the ebb in the opposite direction.

TURN ISLAND lies nearly 5 miles N.W. by N. from the south entrance of the Middle channel. Its eastern point, a cliffy bluff, makes as the extreme of the peninsula which forms the north side of Griffin bay, Park hill rising immediately over its narrow neck. The island should be passed at a distance of over half a mile, particularly going northward with the flood; there is a channel for boats or small craft between it and the peninsula.

Turn rock lies nearly one quarter of a mile N.E. from the island, and covers at high water. The tide sets with great strength over this rock,

and vessels passing up or down the channel are recommended to give it a good berth.

FRIDAY HARBOUR is on the north side of the peninsula, immediately opposite to North bay; it is rather confined, but offers good anchorage, and is easily accessible to steamers or small vessels. Brown island lies in the entrance, and there is a passage on either side of it; that to the eastward is narrow, less than one cable's length, but with a depth of 14 fathoms. Vessels entering by this passage will find anchorage in 7 fathoms in the bight immediately south of it, and distant from the island one-quarter of a mile.* There is a clear channel through, inside the island, of more than one cable in breadth, and a depth of 6 or 7 fathoms.

The passage in, westward of Brown island, is the widest, being 3 cables across. In the centre of the entrance there is a rocky patch, with a depth of $3\frac{1}{2}$ fathoms at low water; it lies $1\frac{1}{2}$ cables W.S.W. from the cliffy point of the island. To avoid it vessels should pass to the westward of it, keeping one cable's length off San Juan island shore.

Anchorage.—Anchor in 9 fathoms, mud bottom, with the passage between the island and main open, and the west cliffy point of Brown island bearing N.N.E. $\frac{3}{4}$ E., and the south point of same island bearing E. $\frac{1}{2}$ S.

Reid rock.—After rounding Turn island, Middle channel trends to the westward, and Reid rock, the least water on which is 12 feet, lies right in the fairway; it is surrounded by thick kelp, which, however, is sometimes run under by the tide. The rock lies $1\frac{1}{10}$ miles W.N.W. from the north point of Turn island, and three-quarters of a mile N.N.E. $\frac{3}{4}$ E. from the north-west cliff point of Brown island; there is a clear deep channel on either side of it. It is $4\frac{1}{2}$ cables from the nearest point of Shaw island, with a depth of 50 fathoms between; and this passage on the north side of the rock is recommended for vessels bound up or down Middle channel, as, having to give the Turn rock a good berth, it is the more direct one.

After passing Reid rock there are no dangers which are not visible. From Caution point, one mile above the rock, on the western side, the channel gradually increases in breadth, and varies but little from a W.N.W. direction, the depth of water increasing to 60 and 70 fathoms.

WASP ISLANDS.—On the eastern side of the channel are the group known as the Wasp islands, between and among which are several passages leading between Shaw and Orcas islands, and communicating with

* The depth of water in the bight is from 13 to 15 fathoms; the depth of 7 fathoms is only on a small shoal patch.—Mr. John Devereux, 1886.

the magnificent harbours and sounds which deeply indent the southern coasts of the latter.

ROCKY BAY, on the western side of Middle channel, 4 miles from Caution point, does not afford much shelter, and vessels are not recommended to use it unless in case of necessity. The small island, O'Neal, lies in the centre of it. There is a depth of 14 fathoms between the island and San Juan, but the bottom is rocky. A reef of rocks, on which the sea generally breaks, extends 1½ cables off the San Juan shore, bearing S.W. by S. from O'Neal island.

Jones island lies in the northern entrance of the Middle channel, on the eastern side, nearly half a mile from Orcas island, being separated from the latter by Spring passage. The island is less than one mile in extent, mostly wooded, but its western points are bare and grassy.

SPRING PASSAGE, between Jones island and the west side of Orcas, is a safe deep-water channel, and saves some distance to a steamer passing up or down Middle channel, by the Douglas channel. It is one mile in length, 4 cables in breadth at its narrowest part, with an average depth of 15 fathoms.

Some rocky patches extend one cable's length off the eastern side of Jones island; and a rock which covers at 2 feet flood lies the same distance north of a small cove on the north-east side of the island; a rocky patch, with five fathoms water on it, lies 2 cables' lengths off the west side of Orcas island, and 6½ cables N.E. by E. from the north-west end of Jones island; therefore it is desirable to pass through in mid-channel.

Passing up or down Middle channel, the north-east end of San Juan should be avoided, as the tides are strong, and a sailing vessel is apt to be drawn into the strong tide-rips and overfalls in the eastern entrance of Spieden channel.

FLATTOP ISLAND, in the northern entrance of Middle channel, 2 miles N.W. by W. from Jones island, is one-third of a mile in length, wooded, and about 100 feet high. At 2 cables' lengths off its western side is a rock nearly one cable in extent and 25 feet above high water. Between it and the island is a deep passage.

DOUGLAS CHANNEL may be said to be the continuation of Middle channel, and leads into Haro strait, between Orcas and Waldron islands. There are other passages leading into the Haro strait, viz., westward of Flattop island, between it and Spieden and Stuart islands; and eastward of Flattop, between it and Waldron island. In the former, the confused tides and eddies are liable to entangle a sailing vessel among

Spieden and the neighbouring groups of small islands and rocks; in the latter, the White rock with its off-lying dangers offers serious impediments to the safe navigation of the same class of vessels.

Douglas channel commences to the southward between Jones and Flattop islands, whence it takes a N. by E. ½ E. direction for 4½ miles, and then turns N.N.W., crosses Haro strait, and at the distance of 6 miles enters the strait of Georgia, between East point of Saturna and Patos island, or between the latter and Sucia island. The narrowest part of the channel is 1⅓ miles between Waldron and Orcas islands; the depth varies from 90 to 108 fathoms, and both shores are free from danger. If necessary, vessels will find a temporary anchorage in 12 fathoms water, in the bay, about 4 cables' lengths southward of the Bill of Orcas.

Directions.—The channel westward of Flattop island is less than one mile in breadth at its narrowest part. Green point of Spieden island is steep-to; a tide-rip is generally met with off it. After passing Flattop island, the channel course is N.W. by N. until Skipjack island opens of Sandy point (Waldron island), bearing N. by E. ¼ E. when a course may be shaped either up or down Haro strait; with the ebb, be careful not to get set into the channel between Spieden and Stuart islands.

The channel eastward of Flattop island, between it and White rock, is about the same breadth as the one just described, but Danger rock, with 5 feet water on it, which lies one-quarter of a mile S.E. by E. from the centre of White rock, must be carefully avoided.

After passing Flattop island, keep its eastern side just touching the western point of Jones island, bearing S.E. ⅓ E., and it will lead nearly three-quarters of a mile westward of Danger rock; when Skipjack island opens out northward of Sandy point, bearing N. by E. ¼ E., all the dangers are cleared.

If passing between White rock and Disney point (the high stratified cliff of Waldron island), the latter should be kept well aboard if the ebb is running; or a vessel is liable to be set on the rock. The west bluff of Sucia should by no means be shut in by the southern part of Waldron island (these two points touching lead three-quarters of a mile eastward of Danger rock, but it must be remembered the ebb sets strongly down on it), until Monarch head is well shut in with Sandy point, the latter bearing N.W. ½ N., steer through with these marks on, and when White rock is in line with the west side of Flattop island, bearing S. ½ W., a vessel will be clear of all dangers, and may steer either up or down Haro strait, giving Sandy point a berth of half a mile.

Tides.—Sailing vessels working through Douglas channel should beware of getting too close over on the Waldron island shore, near Disney

point, as with calm or light winds they would run the risk of being set by the ebb on to Danger rock, on which the kelp is seldom seen. Both flood and ebb set fairly through Middle and Douglas channels, at the rate of 2 to 5 knots.

The ebb tide, coming down between East point and Patos island, strikes the north point of Waldron island, and one part of it, together with the stream between Patos and Sucia islands, passes down Douglas and Middle channels. The other part sets between the Skipjack and Waldron islands; thence southerly through the groups in the neighbourhood of Stuart island into Haro strait, as well as down Middle channel. It should be observed that the ebb stream continues to run down through the whole of the passages in the archipelago, for 2¼ hours after it is low water by the shore, and the water has begun to rise.

PATOS ISLAND lies 2¾ miles E.N.E. from East point of Saturna; the passage between them being the widest, and at present most frequented, though it is not always the best channel from Haro or Middle channels into the strait of Georgia. Patos is 1½ miles long in an east and west direction, narrow, wedge-shaped, sloping towards its western end, and covered with trees. Active cove at its western end is formed by a small islet connected at low water, and affords anchorage for one or two small vessels in 2 fathoms, but a strong tide-rip at the point renders it difficult for a sailing vessel to enter.

The passage into the strait of Georgia between Patos and Sucia islands, although considerably narrower than the one just mentioned, is for several reasons at times to be preferred, especially for vessels passing through Middle channel, or for sailing vessels with a N.W. wind. The tides are not so strong, more regular, and set more fairly through; the passage is 1¼ miles wide, and is almost free from tide rips.

Directions.—If intending to take the passage between Patos and Sucia islands, either up or down, an excellent mark for clearing the Plumper and Clements reefs (dangerous patches lying southward and northward from Sucia), is to keep the remarkable round summit of Stuart island (642 feet high) just open westward of Skipjack island, the westernmost wooded island north of Waldron, bearing S.W. ½ S., this leads well clear of both the reefs, and the same marks would lead across Alden bank in 5 fathoms water.

If taking the passage from the Middle or Douglas channels, keep the white-faced cliffs of Roberts point well open westward of Patos island, the cliffs bearing N.N.W. ½ W., until the marks before described are on, when steer through the passage. If the ebb stream is running, it is better to keep the Patos island shore aboard; 16 fathoms water will be found on the

Sucia shore, but it is not recommended to anchor unless positively necessary.

When standing to the north-eastward, when Clark island is open of the east end of Matia, or Puffin islet, the former bearing E.S.E., a vessel will be eastward of Clements reef.

SUCIA ISLAND is of a horse-shoe shape, remarkably indented on its eastern side by bays and inlets, running in an east and west direction; the largest of these, Sucia harbour, affords fair anchorage. The island is from 200 to 300 feet high, thickly covered with pines, and its western side a series of steep wooded bluffs.

Plumper reef, with 10 feet water on it, lies 1¼ miles S.W. by S. from Lawson bluff, the highest north-west point of Sucia island; 2½ miles N.N.W. from the Bill of Orcas, a remarkable bare knob point on the island of that name; and nearly 2 miles S. by E. from the east point of Patos island. There is a deep passage between Plumper reef and Sucia island, but it is not recommended.

Clements reef, on which there is a depth of 9 feet, lies 1½ miles N.E. ¼ N. from Lawson bluff; one mile N.W. ½ W. from Ewing island (the north-east point of Sucia); and 2 miles E. by N. from the east end of Patos. Some rocky patches covering at high water, and marked by kelp, lie between Clements reef and Ewing island, and it is not safe to pass between them. There is a deep channel of more than one mile in breadth between Sucia and Matia, the island to the eastward of it.

Directions.—Entering Sucia harbour from the northward, steer for it, with the west point of Clark island in line with Puffin islet, about S.E. by E., which leads between Alden bank and Clements reef; when Ewing island bears S.W. by S., alter course to about South, giving the point of the island a berth of at least 3 cables, to avoid some rocky patches which extend 2 cables S.E. from it. When the harbour is well open steer up the centre W. ½ S.; it is better to keep the southern or Wall island shore rather aboard, as it is quite steep, and there are some reefs extending one cable's length off the north shore. When the west point of Ewing is just shut in by the east point of Sucia bearing N.E. by N., anchor in the centre in 7 or 8 fathoms, mud bottom. If intending to make any stay it is desirable to moor, as the harbour is small for a large vessel; it affords good shelter from westerly winds; with those from S.E. some swell sets in but never sufficient to render the anchorage unsafe.

If entering from Douglas channel, keep Orcas bill just touching the south bluff of Waldron island, bearing S.W. ¾ S.; this leads well westward of Parker reef. The south-east points of Sucia may be passed at

one cable's length; they are a series of narrow islands the sides of which are as steep as a wall, with narrow deep passages between them; steer in, keeping the northernmost of these islands aboard, to avoid the reefs on the north side of the harbour. For a steamer it is recommended to pass in between the north and middle Wall islands, as it gives more room to pick up a berth; this passage, though less than one cable wide, has 12 and 15 fathoms water in it, and the wall-like sides of the islands are steep-to.

If bound to Sucia harbour from Rosario strait, pass on either side of Barnes, Clark, and Matia islands as convenient; if northward of the latter, as soon as the harbour is open, steer for it, keeping the southern side aboard as before directed, or passing between north and middle Wall islands; if southward of Matia island, then do not stand so far to the westward as to shut in the north part of Sinclair island with Lawrence point, in order to avoid Parker reef.

Parker reef is of considerable extent, lying in the passage between Sucia and Orcas islands; at low water it uncovers one quarter of a mile of rock and sand, but its eastern end always shows its rocky summit which is just awash at high water. It lies 2½ miles N.E. ¾ E. from Nob point (Orcas bill), and 1½ miles S. ½ E. from the east point of Sucia. There is a passage on both sides of the reef; that to the northward between it and Sucia is one mile wide, with a depth of from 35 to 55 fathoms; that to the southward, between it and Orcas, is half a mile wide, with a depth of from 6 to 8 fathoms, but a stranger is recommended not to use it, as the points of Orcas at this part run off shoal. If the northern passage is used, the north part of Skipjack island kept in line with the south extreme of Pender island bearing W.S.W., leads well clear of Parker reef. A part of the ebb stream setting down between Sucia and Matia islands, runs to the westward strongly over Parker reef, and through the channels on both sides of it; the flood sets in the contrary direction.

A patch of 3 fathoms lies at the distance of one-quarter of a mile W.S.W. from Parker reef, with depths of from 4 to 5 fathoms extending for one-third of a mile from its west side.

Matia island, a little more than one mile eastward from Sucia, is about one mile in extent, east and west, and has no dangers off it; on its southern side are several boat coves. Close off its eastern extreme is Puffin islet, off which a flat rock extends 1½ cables' lengths.

Skipjack and Penguin islands are small islands lying close off the north side of Waldron island; the former is considerably the larger, and is wooded; the latter is small, grassy, and bare of trees. A reef which covers, and is marked by kelp, lies between the two, but between this reef and Skipjack island there is a narrow passage of

8 fathoms. The tides, however, set strongly between the islands, and it is not recommended; neither, for the same reason, is the passage between them and Waldron island unless to those thoroughly acquainted with the navigation.

LOPEZ ISLAND, the southernmost of the islands, on the eastern side of Middle channel, helps to form the western side of Rosario strait, as it does the eastern sides of the Middle channel. It is 9 miles long, north and south, and 3 miles wide, thickly wooded, but differs from all the other islands of the Archipelago in being much lower and almost flat, except at its northern and southern extremes, where elevations occur of a few hundred feet. Its southern side is much indented by bays and creeks, which, however, from their exposed position and rocky nature, cannot be reckoned on as anchorages; on its western side, in Middle channel, is a creek terminating in an extensive lagoon, the former offering great facilities for beaching and repairing ships. On the north shore is Shoal bay affording anchorage; and on the east is the spacious and excellent sound of Lopez, having an entrance from Middle channel as well as three distinct passages from Rosario strait.

MACKAYE HARBOUR, on the south coast of Lopez island, 2 miles eastward of the entrance to Middle channel, is entered between Jennis point on the south, and Long and Charles islands on the north; from the latter it takes an easterly direction for one mile, and then trends to the southward for a short distance, terminating in a low sandy beach. In the entrance there are depths of from 8 to 12 fathoms, muddy bottom, but with the prevailing south-westerly winds the anchorage is a good deal exposed; with northerly or easterly winds there would be fair anchorage. Coasters or small vessels drawing 12 feet may get shelter in the south bight; Jennis point should be passed at about 3 cables' lengths; the anchorage is 1½ miles from it.

Directions.—With south-westerly winds the coast and islands on the eastern side of Middle channel entrance, between Whale rocks and Jennis point, should be avoided, as then a considerable sea sets in; and when passing the coast between Jennis point and cape Colville, it is desirable to keep one mile off shore, as some straggling rocks exist, which will be treated of under the head of Rosario strait.

Shark reef, on the western side of Lopez island, immediately within Middle channel, and half a mile northward of White cliff, consists of two rocks awash at low water, extending a little over one cable off shore, and must be avoided by vessels working up the channel. There are no dangers on the coast of the island for 2 miles north of this reef, but

large vessels working up are not recommended to approach nearer than one quarter of a mile.

CAREEN CREEK, on the west side of Lopez island, is 4 miles from the south entrance of Middle channel, and its entrance lies 2 miles E. ½ N. from Turn island. The western entrance point is a low sandy spit, close round which there are 3 fathoms water, and on it a vessel might, in perfect shelter, be beached and repaired with much facility; the creek terminates in a large salt lagoon.

UPRIGHT CHANNEL, separating Lopez from Shaw island, is a deep steep passage, with depths of from 20 to 28 fathoms, leading from the Middle channel to the sounds of Orcas and Lopez, and by several passages into Rosario strait. The narrowest part of the entrance is between Flat point and Canoe island, and here for a short distance it is scarcely 2 cables in breadth.

Flat point is a low shingle or sandy point, with grass and small bushes on it; it is steep-to, and may be passed at less than one cable's length.

Canoe island.—The shore of Canoe island is fringed by kelp, close outside of which a vessel may pass; a rock marked by kelp lies one cable South of its south point. The tides are not considerable in Upright channel, seldomr over 3 knots, and it is in all respects a safe passage.

Anchorage may be had in 6 or 7 fathoms in Indian cove, westward of Canoe island, with Flat point in line with the south point of Canoe island; the only precaution necessary is to avoid the kelp off the south point of the island.

After passing Flat point, the channel opens out to three-quarters of a mile, in a N.N.E. direction, with a depth of from 20 to 30 fathoms. At 1¾ miles from Flat point on the south side of the channel is Upright hill, the steep cliffy north extreme of Lopez island; it is covered with timber, and is 200 feet high.

SHOAL BAY, close eastward of Upright hill, extends in a S.S.E. direction for one mile to its head, which is separated from False bay in Lopez sound, by a low neck of land only one cable across. Although apparently a considerable sheet of water, the anchorage for large vessels is much limited by a shoal which extends more than half way across from just within the point of Upright hill towards the eastern point of the bay; the shoal then extends up the bay to its head, leaving the greater half on the western side, with no more than from 2 to 3 fathoms at low water.

Anchorage.—The best anchorage for large vessels is in 8 fathoms with Upright point (the west point of the bay) in line with the east point of Shaw island, bearing W. ¾ N., and the east point of Shoal bay S.E. by E.; one cable inside this position there are 4 fathoms; the holding ground is good. Vessels desiring to proceed up the bay after rounding Upright point, which may be passed close to, must steer for the east point of the bay, until within one cable's length of it, and then keep along the eastern cliffy shore at the same distance, when not less than 5 fathoms will be found until within one-quarter of a mile from the head, where there is anchorage in 4 fathoms; the space between the eastern side of the shoal and the eastern shore of the bay is nearly 2 cables.

LOPEZ SOUND, on the eastern side of Lopez island, extends in a S.S.E. direction for 7½ miles, or nearly the whole length of the island, its head reaching within half a mile of the waters of Fuca strait. Its eastern side is formed partly by Lopez and partly by Decatur and Blakely islands, lying parallel with it; and between these islands, as well as northward of the latter, are passages leading into Rosario strait. The average breadth of the sound is nearly 1½ miles, and there is a convenient depth of water for anchorage in almost every part of it.

Directions.—The sound may be entered from the westward through Middle and Upright channels, and from the eastward by the Obstruction passages, or by Thatcher and Maury passages.

To enter from the westward, directions have been already given as far as Upright point, the western point of Shoal bay; from this point to the shore of Blakely island opposite, the breadth of the entrance is 2 miles. Until as far south as Frost island, which is nearly 2 miles within the entrance of the sound, the general depth of water is from 20 to 30 fathoms. Thatcher passage leading into Rosario strait, between Blakely and Decatur islands, now opens out, and in proceeding up the sound the depth soon decreases to 9 fathoms, varying between that and 5 fathoms for a distance of 2½ miles, or as far up as Houston island, the breadth being about 1¼ miles.

Middle bank, on which there are not less than 3 fathoms at low water, is the only impediment between Frost and Houston islands. It is half a mile in extent north and south, 2 cables east and west, and lies almost in the centre of the sound, its north end being one-quarter of a mile S.S.E. from the south end of Frost island, and 1½ miles S.W. by W. ¼ W. from the north entrance point of Thatcher passage, or south point of Blakely island. Between Frost island and the bank there are from 9 to 14 fathoms, and between the south end of the bank and the west shore

of Decatur island there is a channel one-third of a mile wide, with a depth of from 6 to 20 fathoms; close off this part of Decatur island is a ledge of rocks always awash at high water. Between Middle bank and Houston island there is anchorage in any part of the sound in from 5 to 7 fathoms, mud bottom.

Just above Houston island, and abreast Maury passage (between the south end of Decatur and the north-east point of Lopez), the water deepens to 13 and 15 fathoms, and this depth is carried for 1½ miles, or as far as Crown islet, a small steep rocky islet on the eastern side, within one mile of the head of the sound.

Tides.—There is but little stream of tide felt in Lopez sound, unless in the immediate neighbourhood of the narrow passages from Rosario strait.

Entrance shoal, with 2 fathoms water on it, and marked by kelp, must be avoided by vessels working in; it lies 1½ miles N.E. by E. ¾ E. from Upright point, and half a mile from the shore of Blakely island; there is deep water on either side of it.

False bay, on the west side of the sound, one mile from Shoal bay, is only separated from it by a low narrow neck, one cable's length across, the cliffy extreme of the peninsula being Separation point. A shoal, on which there is a depth of 2 fathoms, extending from the centre of False bay, and connecting with the small island of Arbutus, lying in its entrance, renders it unfit for anchorage except for small vessels; but vessels may anchor in 8 fathoms southward of Arbutus, between it and Frost island.

Half-Tide rock, covering at half flood, and not marked by kelp, is in the track of vessels entering. It lies three-quarters of a mile S.E. by E. ½ E. from Separation point, and 4 cables N.N.W. ¼ W. from Arbutus island. It is better to pass eastward of it, when it is not visible; the point of Upright hill kept just open of Separation point, bearing W. by N. ¼ N., until the clay cliff of Gravel spit is in line with the east point of Arbutus island, bearing S. by E., will lead clear of it.

Frost island, half a mile long north and south, lies close off Gravel spit on the west side of the sound; it is wooded, and its western side a steep cliff, between which and the spit end there is a narrow channel with a depth of 5 fathoms.

Black and Crown islets.—The Black islets are a ridge of steep rocky islets, lying within and across the entrance of Maury passage; at 2 cables S. by W. from the southernmost of these islets is a rock which covers at quarter flood. There is a passage of 8 and 9 fathoms on either side of Crown islet, and anchorage above it in 5 or 6 fathoms, but vessels should not proceed far above, as at the distance of one-third of a mile it

shoals to one and 2 fathoms, and dries for a considerable distance from the head of the sound; there is also good anchorage in 5 fathoms in the bight, westward of Crown islet.

Passing up the sound between Crown islet and the western shore a rocky patch of 2 fathoms must be avoided; its lies one-quarter of a mile W. by N. ¼ N. from Crown islet, and 4 cables from the western shore of the sound; there are 12 fathoms close to it, and deep water in the passage on either side of it.

Thatcher passage, between Blakely and Decatur islands, is the widest and most convenient passage into Lopez sound from Rosario strait; it is 1½ miles in length, and its narrowest part 4 cables wide, with a general depth of from 20 to 25 fathoms.

The tides in Thatcher passage run from 2 to 4 knots.

Lawson rock, lying almost in the centre of the eastern entrance, is the only danger, and covers at 2 feet flood. It lies 4 cables N.W. by N., from Fauntleroy point, the south-eastern entrance point, in line with Round head (half a mile to the southward), and a little more than half a mile S. by W. ½ W. from the White rock. There is a good passage on either side of the rock, but that to the southward is the best.

Directions.—Entering Thatcher passage from the southward, if the flood is running, the south shore should be kept pretty close aboard, as until well within the passage it sets up towards Lawson rock.

When the passage between Decatur and James islands is shut in by Fauntleroy point, a vessel will be just westward or inside the rock.*

Vessels entering by Thatcher passage, and drawing over 18 feet, should avoid the Middle bank by keeping the south shore aboard within 2 cables; White rock in line with the south point of Blakely island leads over the tail of the shoal in 20 feet.

The flood tide sets from Rosario strait through Thatcher passage both up and down the sound; a slight stream of flood also enters the sound from the northward.

Maury passage, between Decatur island and the north-east point of Lopez, is the southernmost entrance to the sound from Rosario strait. It is scarcely 2 cables wide at the entrance, with a depth of 12 fathoms; the Black islets lie across the western entrance, and it is necessary to keep to the southward, between them and Lopez.

Obstruction passages.—Obstruction island lies in the centre of the channel, between the north point of Blakely and the south-east point of Orcas island, and the passages on either side of it form safe and

* A small iron beacon placed on this rock would render the passage quite safe for any class of vessel.

convenient communication, by Upright channel, between the Middle channel and Rosario strait; they likewise lead from Rosario strait to Orcas and Lopez sounds. These passes are more adapted to steam than sailing vessels, although there would be no difficulty with a leading wind and fair tides. Small vessels would find no difficulty if the tides were properly taken advantage of.

North Obstruction Pass is about 1¼ miles long, and its average breadth 2 cables. Entering from the eastward it takes a westerly direction for two-thirds of a mile, then S.S.W. for nearly the same distance, the narrowest part (less than two cables) occurring just after making the bend; the general depth of water is from 8 to 14 fathoms, and there are no dangers which are not visible. In consequence of the bend in this channel it has more the appearance of a deep bay, when seen from either entrance. The east end of Obstruction island should not be approached nearer than one cable, as shelving rocks extend a short distance off it; the best course for a steamer is to keep in mid-channel. The eastern entrance bears W.S.W. from Cypress cone, a remarkable bare peak on the north end of Cypress island.

South Obstruction Pass, though narrower than the North, is perhaps the better channel of the two, as it is not more than three-quarters of a mile in length, and is perfectly straight in a N.E. and S.W. direction. Its narrowest part is not much more than one cable wide; the depth of water much the same as in the northern pass. On the south side of the eastern entrance two rocks extend off Blakely island, the inner being always above high water; the outer, a long black rock, is nearly one-quarter of a mile off shore, and is just awash at high water.

Entering from Rosario strait the pass should be brought well open bearing S.W. before approaching it nearer than half a mile; in like manner when passing into Rosario strait, if the black rock is not seen, a N.E. course should be maintained until at that distance from the eastern entrance. When the west point of Burrows island opens out eastward of the east point of Blakely island, bearing S.E., a vessel will be half a mile eastward of any dangers. The south side of the pass appears like a round wooded island, in consequence of the land falling abruptly behind it, where there are two lagoons.

Tides.—The flood tide in both passes sets to the westward from Rosario strait, and the ebb to the eastward; the latter runs for nearly two hours after it is low water by the shore; the strength varies from 2 to 5 knots.

SHAW ISLAND is much of the same character as Lopez, though considerably smaller, being about 3 miles in extent in any direction.

It is the continuation of the eastern side of the Middle channel, and between it and Orcas island lie the Wasp group, among which are several passages leading to Orcas and Lopez sounds, and into Rosario strait.

WASP ISLANDS and PASSAGES.—The Wasp islands, five in number, besides some smaller islets and rocks, lie on the eastern side of Middle channel, between Shaw and Orcas islands.

Yellow island, the westernmost of the group, is rather remarkable from its colour, grassy and nearly bare of trees, the remainder of the group being wooded; from its west end a sandy spit extends one cable, having at its extreme a rock which dries at low water, and around which kelp grows; this point should be avoided when passing up or down Middle channel.

Brown and Reef islands lie northward of Yellow island; off the west side of the latter a reef extends for more than one cable's length, and several rocks surrounded by kelp, extend over one cable's length off the west side of Brown island. Wasp passage leads through this group to Orcas sound and Rosario strait. With the assistance of the chart a steamer would find but little difficulty in passing through it, though the passage by Upright channel is to be preferred.

Crane island, on the northern side of Wasp passage, is wooded, and much larger than either of the Wasp group.

Nob islet is a remarkable round islet, 50 feet high, with two or three bushes on its summit; it lies just westward of Cliff island.

Directions.—Passing between Brown and Reef islands, where the channel is nearly one-quarter of a mile wide, with a depth of 9 fathoms,* Bird rock (awash at high water) may be passed on either side; the widest passage is to the eastward of it, between it and Crane island, where the channel is one-quarter of a mile across, and has a depth of 15 fathoms. The passage northward of Crane island is so narrow that it appears joined to Orcas. After passing Bird rock steer to the southward of Crane island, between it and Cliff island (the south-easternmost of the Wasps), and thence between Crane island and the north end of Shaw island.

For two-thirds of a mile the channel is of a good breadth, with no dangers until approaching the east end of Crane island, when it narrows to little more than one cable. The steep cliffy shore of Shaw island must now be kept aboard to avoid the Passage rock, which lies 1½ cables

* H.M.S. *Sparrowhawk* passed over a depth of 4 fathoms surrounded by kelp, lying between Reef and Brown islands.

eastward of Passage island. Nob islet, just touching the north end of Cliff island, and just open southward of the south side of Crane island, leads one cable's length south of Passage rock, which is covered at 2 feet rise.

When Orcas nob is just over the narrow passage between Double islands and the west shore of West sound, bearing N.N.W. ¾ W. a vessel is eastward of Passage rock, and may steer up West sound, or eastward for East sound, or Rosario strait. Passing out of West sound the same marks are equally good; steer down just westward of Broken point (a remarkable cliffy peninsula on the north side of Shaw island) until they are in line, when steer for them, giving the south side of Crane island a moderate berth, and passing out of Wasp channel, as before directed for entering it.

If desired, a vessel may pass into Wasp channel to the southward of Yellow island, between it and Low island (a small islet), thence northward of Nob islet, and as before directed, between Crane and Cliff islands.

There is another passage into Wasp channel southward of Cliff island, between it and Neck point, the remarkable western extreme of Shaw island. The breadth between them is a little over one cable, but there is a patch of 4 fathoms, with kelp on it, in the centre of the passage. If taking this channel there is a reef lying S.W. ½ S., and extending more than one-quarter of a mile from the south-west end of Cliff island; this reef is sometimes covered, and is the only danger known that is not visible.

These two latter passages are the shortest into the Wasp channel for vessels from the southward. The eye will be found the best guide; a good look-out is necessary, and to a steamer there is no difficulty. To the northward of Crane island, between it and Orcas, there is a narrow channel, but though deep it is only fit for boats.

Tides.—The flood tide sets to the west in the eastern entrance of Wasp channel, but in the western entrance the flood from the Middle channel partially sets to the eastward, and causes some ripplings among the islands, which may be mistaken for shoal water.

North passage.—This clear deep channel leading to Deer harbour, the westernmost port in Orcas island, lies between Steep point, (the south-west point of Orcas), and Reef island, (the northernmost of the Wasp group). It is nearly one-quarter of a mile wide and 20 fathoms deep, and the only danger to avoid is the reef off the west side of the latter island. To enter Deer harbour; after passing Jones island, keep Steep point and the shore of Orcas aboard within 1½ cable's lengths, until past Reef island, when haul up to the northward and anchor as convenient. Deer harbour may be entered equally well between Reef and Brown islands;

a patch of 2 fathoms lies nearly one cable S.W. by W. from the north-west point of the latter.

ORCAS ISLAND is the most extensive of the group known as the Haro archipelago, and contains the finest harbours. It is mountainous and in most parts thickly wooded, although in the valleys there is a considerable portion of land available for agricultural purposes, and partially clear of timber. Its southern side is singularly indented by deep sounds, which in some places almost divide the island; this is particularly the case in the East sound, separated only from the waters of the strait of Georgia by a low neck of land one mile across. On the eastern side of this sound, mount Constitution rises to an elevation of 2,420 feet, wooded to its summit; on the west side is the Turtle Back, a long wooded range 1,600 feet high, and west of it, rising immediately over the sea, is the singular bare top cone known as Orcas nob, a remarkable object when seen either from the north or south.

Deer harbour and West and East sounds are on the south side of the island; but on the western and northern sides there is no convenient anchorage. A vessel might drop an anchor, if necessary, southward of the Bill of Orcas, (a remarkable projecting bare point, with a nob on its extreme) where 12 fathoms water will be found within one cable's length of the shore; a small vessel might also anchor in 4½ fathoms, just inside a small islet in the bay two-thirds of a mile southward of the Bill.

The north coast is steep and precipitous, except between the Bill and Thompson point, a distance of 2½ miles; here occurs the low land at the head of East sound, and the points are shelving with large boulder stones extending some distance off; immediately off this part of the coast is Parker reef (*see* page 104).

Thompson point is bare and cliffy; from it the coast forms a slight curve easterly to Lawrence point, distant 6 miles.

Lawrence point, the sloping termination of the high range of mount Constitution, is the eastern extreme of Orcas island; on its northern side it is a steep and almost perpendicular cliff, and from it the coast turns abruptly to the southward, forming the western side of Rosario strait; 4 miles southward from the point is the entrance to North Obstruction pass.

DEER HARBOUR, the westernmost of the three ports of Orcas, is conveniently entered from the Middle channel by North passage, between Steep point (Orcas island) and Reef island; or between the latter and Brown island of the Wasp group. The harbour is one mile long in a north and south direction, and about the same breadth at its southern end;

it narrows, however, rapidly, and terminates in a shoal creek, and fresh water streams fed from a lake.

Fawn islet lies off the steep cliffy shore of the west side of the harbour; below it the depth varies from 10 to 15 fathoms; abreast and above it from 5 to 8 fathoms, mud bottom.

Anchorage.—A convenient berth is in 7 fathoms, half-way between Fawn islet and the eastern shore, or a snug anchorage in 5 fathoms, will be found one-quarter of a mile above the islet. Between Fawn islet and the western shore is a passage one cable wide with 9 fathoms. There are no dangers to be avoided in this harbour, except a reef of rocks extending from the north side of Crane island; the west end of this island in line with the west end of Cliff island (Wasp group) bearing S. by W. ½ W. leads on to the western edge of this reef, on which there is only one fathom water. If working up the harbour, a vessel should not stand so far to the eastward as to shut in the east end of Cliff island behind the west end of Crane island; this will lead more than one cable clear of the reef.

WEST SOUND may be entered from Middle channel, either by the Wasp or Upright passages already described, or from Rosario strait by either of the Obstruction passes. Having entered by the Wasp passage, cleared the Passage rock, and being off Broken point (a remarkable cliffy point, the extreme of a small peninsula on the north side of Shaw island), West sound will be open, extending in a N.W. ½ N. direction for more than 2 miles, with Orcas nob immediately over the head of it. The sound is about three-quarters of a mile broad, with depths of from 10 to 16 fathoms, and no hidden dangers.

Anchorage may be had in any part above Double islands, which lie close off its western shore, half a mile N.W. from Broken point, but the snuggest anchorage, and the best for vessels intending to make any stay, is either in White Beach bay, on the eastern shore, or in Massacre bay at the north-west head of the sound.

White Beach bay, so named from the quantities of white clam shells lying on its shores, and giving them the appearance of white sandy beaches, is on the eastern side of the sound, 2 miles above Broken point; a small islet, Sheep islet, lies in the middle of the bay, nearly connected with the shore at low water.

Anchorage.—There is good anchorage in 9 fathoms water, with Sheep islet bearing N.E. ½ N., and Haida point, the northern point of the bay, N.W. by W., distant one-quarter of a mile.

Massacre bay is the continuation of the head of West sound, between Haida and Indian points, and the anchorage is nearly one mile

above White Beach bay. Harbour rock, covering at one-third flood, lies almost in the centre of the bay, between the two entrance points, one-third of a mile W. ¾ S. from Haida point, and nearly three cables E.N.E. from Indian point on the opposite shore; it may be passed on either side in a depth of 9 fathoms. If to the eastward, Haida point should be kept within 1½ cables; if to the westward, the eastern cliffy part of Broken point, and the eastern side of Double islands kept in line astern bearing S.E. ½ S., leads nearly one cable westward of the rock; when Indian point bears South, good anchorage will be found in the centre of the bay in 8 fathoms, mud bottom.

HARNEY CHANNEL, between Orcas and Shaw islands, connects the West and East sounds of Orcas. It commences at Broken point, and takes an easterly direction for 3 miles, when it enters Upright channel between Foster and Hankin points; the former is a low sloping green point, the southern termination of the peninsula which separates the two sounds; the latter is the eastern bluff wooded point of Shaw island. The depth of water in this channel varies from 20 to 30 fathoms, and its average breadth is half a mile, though it narrows for a short distance about its centre to one-quarter of a mile.

The north side of Harney channel is a series of small bays with shingle beaches, and there is a deep cove two-thirds of a mile west of Foster point; just westward of this cove, and N.W. from Hankin point, is a rocky patch which lies more than one cable off shore, and covers at half flood.

Camp cove is immediately northward of Foster point; it is a convenient cove for boats, or a small vessel might anchor there in 6 fathoms; there is a good stream of fresh water running into it.

High Water rock lies more than one cable's length from the shore, half a mile north-eastward from Foster point; it is awash at high water, and there is a depth of 8 fathoms between it and the shore.

Blind bay is on the south shore, midway between Broken and Hankin points. A small round islet partially wooded lies in the centre of the entrance, and a reef of rocks covering at high water extends from its western point, almost choking the entrance on that side, but leaving a narrow passage close to the islet; a rock covering at one-quarter flood also lies off the eastern side of the islet, leaving a channel of 5 fathoms almost equally narrow on that side, so that the bay is only eligible for coasters, which should keep the island close aboard when entering; the eastern side is the best.

Anchorage in 4 or 5 fathoms may be had with the islet bearing N.N.W., distant 2 cables.

EAST SOUND.—Entering this sound by Upright channel, or through the Wasp passages and Harney channel, when abreast Upright hill (from which Diamond point, the western point of the sound, bears North distant 2 miles) its entrance will be easily made out. If by the Obstruction passes, as soon as a vessel is at their western entrance, the whole length of the sound will be open bearing N.W. ½ W.; remarkable conical hills, over 1,000 feet high, rise on both sides of the entrance, which is between Diamond and Stockade points. From between these points the sound takes a N.W. by W. direction for 6 miles, and is three-quarters of a mile broad for 2 miles; it then contracts at Cascade bay to half a mile, and opens out again above to more than one mile wide; the head of the sound terminates in two bays, separated by a jutting cliffy point. The general depth of water in the sound is 15 fathoms.

Stockade bay, on the eastern side of the entrance to the sound, nearly one mile North of Stockade point (the north-western entrance point of North Obstruction pass) affords anchorage in 8 fathoms, at about 3 cables' lengths from the shore; there is a good stream of fresh water running into the bay; with a strong S.W. wind some swell sets into this anchorage.

Green bank, on the western side, immediately opposite Stockade bay, is a bank of sand extending half-way across the sound; on it there are depths of from 5 to 9 fathoms, with one patch of 4 fathoms, and a vessel might anchor on it if necessary, as being more convenient than the deep water immediately off it. The best anchorage is in 6 fathoms at half a mile North of Diamond point, with a small green islet, which lies just off a white shell beach, bearing West, distant about 4 cables.

Cascade bay, on the eastern side of the sound, 2 miles above Stockade bay, is formed by a small hook of land facing the S.E. Anchorage may be had 1½ cables' lengths from the beach in 10 fathoms; but it would not be a desirable place to lay with a south-easterly wind.

Water.—A large stream falls by a cascade into the above bay, and it would be a convenient place at which to water a ship.

Fishing and Ship bays.—Fishing bay, the westernmost of the two bays at the head of the sound, has good anchorage in 10 fathoms, with Arbutus point, the cliffy extreme of the jutting peninsula before mentioned, bearing N.E., midway between it and the west side of the sound.

Ship bay, eastward of Arbutus point, runs off shoal for 2 cables' lengths, or nearly to the extreme of the point; but it affords good shelter, perhaps better than Fishing bay. There is good anchorage in 9 fathoms, mud bottom, with Arbutus point bearing W. by N., distant 3 cables.

CHAPTER IV.

ROSARIO STRAIT AND SHORES OF GEORGIA STRAIT.

Variation 22° 55′ to 23° 10′ East, in 1888.

ROSARIO STRAIT* is the easternmost and one of the principal channels leading from Juan de Fuca strait into that of Georgia. Its southern entrance is between Lopez and Fidalgo islands, and from thence its general direction is from N.N.W. to N.W. for 25 miles, when it enters the latter strait. Its western shores are formed by Lopez, Decatur, Blakely, and Orcas islands; its eastern by Fidalgo, Cypress, Sinclair, and Lummi islands, as well as by the coast of the main land.

Like Haro strait, the Rosario has several smaller channels which branch off to the eastward, and lead between islands to the United States settlements in Bellingham bay, or by a more circuitous route into the strait of Georgia itself; among the principal of these channels, are Guemes, Bellingham, and Lummi. The greatest breadth of the strait is 5 miles at its southern entrance; the narrowest, is about the centre, between Blakely and Cypress islands, where it is less than 1½ miles; the depth varies from 25 to 45 fathoms, occasionally deeper.

The principal dangers are the Bird and Belle rocks, which lie almost in the centre of the strait, 4 miles within the southern entrance. There are several anchorages available for vessels delayed by the tides or other causes; Davis bay on the eastern side of Lopez island, 3 miles within the southern entrance; Burrows bay, immediately opposite it under mount Erie on the west side of Fidalgo island; Ship bay in Guemes channel; and Strawberry bay, on the western side of Cypress island, are the principal. Vessels entering Fuca strait, and bound to any of the ports of Puget sound, or up Rosario strait, either by day or night, should make New Dungeness light (*fixed* white), which is 69 miles from the light at Tatoosh island (*see* pp. 18, 19, 25), and then Smith or Blunt island.

Tides.—The tides in Rosario strait are strong, from 3 to 7 knots in the narrower parts.

SMITH or BLUNT ISLAND lies almost in the centre of the eastern end of Fuca strait, 13⅓ miles N.N.E. ¾ E. from New Dungeness, and 6 miles South from the entrance of Rosario strait. It is about half a mile in length, cliffy at its western end, and 50 feet high; a large kelp patch extends for nearly one mile and a half from the western extreme,

* *See* Admiralty chart:—Haro and Rosario straits, No. 2,689; scale, $m = 0{\cdot}5$ inches.

which should be avoided; there are 6 fathoms water on its outer edge. From the eastern end of the island, which is low, a sand spit extends in a north-easterly direction for three-quarters of a mile, partially covered at high water; on the north side of this spit there is anchorage in 5 fathoms, sandy bottom, about half a mile from the shore, and in a direct line between the high water end of the spit and the extreme of the kelp off the west end of the island; but no vessel should lie here with any appearance of bad weather. The ebb tide here, as in the narrower straits, runs from 2 to 2½ hours after low water.

Beacon.—A beacon has been erected on Minor island, at the extremity of the spit extending from the eastern end of Smith or Blunt island.*

LIGHT.—On the summit of Smith or Blunt island, near the west end is a lighthouse painted white, with a red lantern, from which, at an elevation of 90 feet above the sea, is exhibited a white light, which *flashes* every *half minute*, and should be visible in clear weather from a distance of 15 miles.

DIRECTIONS.—Having made Smith island, which vessels bound from sea up Rosario channel should do on about a N.E. ½ E. bearing, it may be passed on either side; but to the northward appears most convenient. When Dungeness lighthouse bears S. by W. keep it on that bearing, astern, steering N. by E., which leads midway between Smith island and the Fonté bank, an extensive kelp patch lying 8 miles W. ½ S. from it, on which the least water yet found is 3½ fathoms (*see* page 49); by day this patch will be always seen in time to avoid it.

When the lighthouse on Smith island bears E. by S. a vessel will be to the northward of the patch, and a course may be steered for the entrance of the strait, which, however, should not be entered at night, until there is a light on Bird or Belle rocks, unless by those perfectly acquainted with the navigation, and the state of the tide. If passing to the southward of Smith island, remember to avoid Partridge bank, the least water on which, 2¼ fathoms, is 3⅓ miles W. by N. ½ N. from Partridge point, a remarkable white-faced cliff on the main; and 3⅛ miles S.S.E. ½ E. from the lighthouse on Smith island. The north-western edge of the bank is marked by a *black* buoy.* (*See* page 27).

Vessels from the southern parts of Vancouver island, bound up Rosario strait, should of course pass northward of Smith island. The only dangers to be avoided are the Saimon bank, with 10 feet of water over it, off the south end of San Juan, and the Davidson rock off Colville island. Mount Erie (on Fidalgo island) in line with Jennis point, bearing N.E. by E. ¼ E., leads 1¼ miles south of the former, and it is not recommended to pass the

* Lieut. R. ff. Powell, R.N., H.M.S. *Caroline*, 1887.

southern side of Lopez island at less than one mile, which will ensure clearing the latter; moreover, the coast is rocky, and the flood tide sets on to it. There are several indentations, with sandy beaches, on the south side of Lopez, which, although offering shelter for boats, are not recommended as anchorages for vessels.

Cape Colville, the south-eastern extreme of Lopez island, is the western entrance point of Rosario strait; Walmouth hill, flat-topped, and about 450 feet high, rises immediately over it.

Colville island, small, and bare of trees, about 40 feet high, lies one mile S.S.W. from the cape; close to the cape, and appearing from most points of view a part of it, is Castle island, a high precipitous rock. Entering the strait, Colville island should be given a berth of one mile.

Davidson rock, on which is only a depth of 4 feet at low water, and occasionally uncovering at low springs, lies a little more than 3 cables East from the east end of Colville island, and nearly one mile South from the cape itself; kelp grows about the rock, but the patch is so small that it is difficult to make out. Kellett island, or cape St. Mary, kept open of the extreme of cape Colville, bearing N.N.W., leads half a mile to the eastward of the rock, and Eagle point (San Juan) kept open of the south end of Lopez island, bearing W. ¼ N., leads one mile southward of it.

Kellett island is a small flat-topped islet, covered with grass, lying immediately northward, and close off the low extreme of cape Colville.

Kellett or Hulah ledge.—Cape St. Mary, the next point northward of cape Colville, and a little more than one mile from it, forms the southern point of Davis bay.

Kellett or Hulah ledge, with one fathom water on it, and marked by kelp, lies 3 cables N.E. by N. from cape St. Mary; there is a deep passage between it and the cape. Vessels passing outside it should give the cape a berth of over half a mile.

DAVIS BAY.—Anchorage.—Davis bay affords good and convenient anchorage in a moderate depth of water. After rounding Hulah ledge, a vessel may stand to the westward into the bay, and anchor in 6 fathoms, mud bottom, at little more than half a mile from the shore, with cape St. Mary bearing S.E. by S.; inside this the water shoals rather suddenly to 2½ and 3 fathoms. A kelp patch, on which there is shoal water, lies one mile N. by W. from the cape. There is anchorage in from 4 to 8 fathoms anywhere within one mile of the east shore of Lopez and Decatur islands, from a little northward of cape St. Mary, as far north as the white cliff of Decatur island, avoiding the kelp patches just mentioned, or while the Bird rock bears anything to the northward of East, and but little tide will be felt. With the Maury passage open, bearing West, there is good

anchorage, at from half a mile to one mile from the shore, in from 6 to 8 fathoms.

Burrows bay, on the eastern side of the entrance to Rosario strait, is well marked by mount Erie, a remarkable conical hill, rising 1,250 feet immediately over it, at one mile from the coast. The bay is sheltered from westerly and south-westerly winds by Burrows and Allan islands, and affords good anchorage to vessels wind or tide bound.

Williamson rock, 22 feet above high water, lies in the southern entrance of the bay, half a mile south of Allan island.

Directions.—The best entrance, which is one mile in breadth, is to the southward of Williamson rock, between it and Fidalgo island. On the eastern side of Allan island the water is deep for half a mile off shore, having depths of from 18 to 25 fathoms. The eastern shore of the bay is shoal for 3 cables' lengths off the beach, and in one spot a boulder, awash at low water, lies nearly 4 cables' lengths off, and nearly 1½ miles E. by N. ½ N. from the south point of Allan island.

Vessels from the northward may enter Burrows bay by the passage northward of Burrows island, or between the latter and Allan island; they are about an equal breadth, a little over 2 cables wide at their narrowest part, free from danger, and lie nearly east and west; in the northern passage depths of from 10 to 20 fathoms will be found; in the southern, between the islands, from 20 to 30 fathoms, the latter is the straighter.

Anchorage may be had in 6 fathoms, with the passage between Burrows and Allan islands open bearing W.S.W., half a mile from Young island; but the most sheltered anchorage is in 12 fathoms at the north head of the bay, half a mile from the eastern shore of Burrows island, with the passage shut in, and Young island bearing S. by W. ½ W., if, however, only a temporary anchorage is desired, the former will be found the most convenient.

Tides.—The ebb tide sets to the eastward into both passages, at the rate of 3 to 4 knots during springs.

Dennis rock.—There is a deep channel half a mile in breadth, between Williamson rock and Allan island, but vessels taking it, or working up westward of the latter island, must avoid Dennis rock, which has 2 feet on it at low water and rarely uncovers. It lies nearly 6 cables N.W. by W. from Williamson rock, and the same distance W.S.W. from the south end of Allan island.

DECEPTION PASS.—At 2 miles southward of the south entrance to Burrows bay is a narrow channel separating Fidalgo from Whidbey island, and communicating with the waters of Puget sound and Admiralty

inlet; but it is only eligible for such small vessels or steamers as are well acquainted with the locality. The tides set through it with great velocity.

Lawson reef, on which there is only a depth of 3 fathoms at low water, is a ledge of small extent lying $1\frac{6}{10}$ miles S.W. by W. ½ W. from the West point of Deception island at the entrance to Deception pass.

Bird rock, lying almost in the centre of Rosario strait, nearly 4 miles N. ¼ E. from cape Colville, is composed of three detached rocks close together, the southernmost being the largest, and 30 feet above high water. There is deep water close to it, but on account of the strong tides, sailing vessels working up or down, particularly during light winds, are recommended to give it a berth of half a mile. There is an equally good passage on either side of the rock; that to the eastward is the wider (2 miles across); to the westward it is one mile wide, with somewhat less tide. By taking the latter channel with a leading wind, a stranger will more easily avoid the Belle rock; passing Bird rock at a convenient distance, steer just outside, or to the eastward of James island, until the passage between Guemes and Fidalgo islands is open.

Belle rock, the most serious danger in the Rosario strait, only uncovers near low water, and the tides set over it from 2 to 5 knots. It lies 6 cables N. by E. ¾ E. from the Bird rock, and in the passage between them are depths of 8 to 20 fathoms. Vessels, however, are recommended not to pass between them except in cases of necessity. The Belle rock is easily avoided by day; if passing to the eastward of it, keep Lawrence point, (the eastern point of Orcas island), just shut in by Tide point (the western extreme of Cypress island), bearing N.N.W., which will lead more than half a mile clear of it; when the passage between Guemes and Fidalgo islands is just open, a vessel will be more than one mile to the northward of it.

If taking the channel westward of Bird rock, keep that rock well eastward of cape Colville until Guemes channel is open. The great danger of the Belle rock to a sailing vessel, is, being left with a light wind in the centre of the strait, as the water is too deep to allow of an anchor holding in so strong a tideway.

James island, almost divided in the centre, is a remarkable saddle island with two summits, 250 feet high, lying close off the east side of Decatur island; there are no dangers on its off or eastern side.

White and Black rocks are three-quarters of a mile apart, and lie off the south-east shore of Blakely island. White rock, the southernmost, is 16 feet above high water and a little more than one-quarter of a mile from the shore at the eastern entrance of Thatcher passage (*see* page 109). Black rock, 10 feet high, lies three-quarters of a mile N.E. by N.

from White rock, and half a mile from Blakely island; there is a deep channel between these rocks, as also between them and Blakely island.

CYPRESS ISLAND, northward of Fidalgo, forms a portion of the eastern side of Rosario strait. It is 4 miles long, by about 2 in breadth, and its high summits, rising to 1,525 feet, are thickly wooded with pine, and white cedar trees; on its northern extreme, a remarkable bare, rocky cone rises immediately over the sea to 720 feet. A reef of boulder stones, some of which uncover, with kelp growing about them, extends half a mile off the south-west point of the island; the outer boulder covers at half flood. Between Cypress and Blakely islands is the narrowest part of Rosario strait, being $1\frac{1}{3}$ miles across, and here the tides during springs occasionally run between 6 and 7 knots.

STRAWBERRY BAY, on the western side of Cypress island, will be known by the small island of the same name, which lies immediately off it, $1\frac{1}{4}$ miles N.W. from Reef point, the south-west extreme, and protects the bay from the westward; it is rather a confined anchorage, and at certain times of tide would be difficult of entrance to a sailing vessel.

The bay is exposed to S.S.E. winds, which, however, do not frequently blow; from S.E. it is sheltered, and there is no reason to doubt but that, with good ground tackle, a vessel would ride out any gale. There is a passage of 10 fathoms water to the northward between Strawberry and Cypress islands; and in the event of parting or slipping, a vessel should run through this passage, and take shelter in Birch or Semiahmoo bays (*see* pp. 125, 126).

Directions.—A sailing vessel should not attempt to enter the bay during the strength of the tide, unless with a commanding breeze, and should remember that the tides set with great strength against the points of Strawberry island; it was remarked that, while the ebb was running strongly in Rosario strait, which it continues to do for $2\frac{1}{2}$ hours after low water, a stream of flood set to the northward through Strawberry bay, as soon as it was low water by the shore.

Anchorage.—About 3 cables from the sandy bight of the bay, with the north bluff of Strawberry island bearing W.N.W., and the south point of this island S.W. by S., is the best berth, in 7 fathoms, good holding ground, and nearly out of the tide, which sets with considerable strength inside Strawberry island.

Water.—There is a belt of flat marsh-land in Strawberry bay, through which several streams of good water run from the mountains.

Rock islet, a small round islet covered with trees, lying nearly 2 cables northward of the north end of Cypress island, has its shores

strewed with large boulder stones. There is a passage of 9 fathoms water between it and Cypress island; but the ebb tide sets with great strength to the southward, and, indeed, close round the western points of the latter island.

Cypress reef, lying one-third of a mile W. ½ S. from Rock islet, is a dangerous rocky patch with kelp growing about it, covering at half flood. James island kept open of Tide point, the west point of Cypress island, bearing S. ¾ E., leads to the westward of the reef; and Rock islet bearing E.S.E., or either of the Cone islands open of it, leads to the northward.

SINCLAIR ISLAND, thickly wooded, and comparatively low, lies to the north-eastward of Cypress island, with a deep passage, of nearly one mile in breadth, between them, leading to Bellingham channel. Shelving rocks project a short distance off its western shores.

Panama reef, an extensive and dangerous shoal, extends nearly half a mile in a W.N.W. direction off the north-west extreme of Sinclair island, some parts of it uncovering at half-tide; a large boulder stands on the inner part of the reef. Great quantities of kelp grow in the neighbourhood, but it is sometimes run under by the tide or concealed by the ripple; there are 6 fathoms water close to the edge of the kelp. By keeping Cypress cone open to the westward of Rock islet, or the strait between Cypress and Blakely islands well open, a vessel will clear it in passing up and down; and Vendovia island open of the north end of Sinclair island, leads clear to the northward of it.

The Peapods are two small rocky islets, bare of trees, lying half a mile from the western shore of Rosario strait, and from 1¼ to nearly 2 miles southward from Lawrence point. They are three-quarters of a mile apart in a N.N.E. and S.S.W. direction, the northernmost being the larger and higher. A little to the westward of a line drawn between them is a third rock which just covers at high water. There are no dangers about them which are not visible, and there is a passage 20 fathoms deep between them and Orcas island.

The eastern side of Orcas island, between the Peapod islets and Obstruction pass, falls back in a bight, where there is considerably less tide than in the main stream of the strait, and if necessary a vessel may drop her anchor within half a mile of the shore in about 16 fathoms water.

Lawrence point, the eastern extreme of Orcas, is a long sloping point, the termination of the ridge of mount Constitution; immediately on its north side it rises abruptly in high, almost perpendicular cliffs, and trends to the westward, falling back for 3 miles in a somewhat deep bight, which is rocky, has deep water, and is unsheltered.

To the northward, Rosario strait lies between Orcas and Lummi islands, the direct channel being along the western shore of the latter in a N.W. ½ W. direction. Anchorage may be had, if necessary, on the eastern side of the strait, within one mile of the shore in 15 fathoms, between Sandy and Whitehorn points, northward of Lummi island.

Tides.—After passing northward of Lawrence point, the ebb tide sets to the eastward between Orcas and the small islands to the northward of it, as well as to the S.E. through the northern entrance of the strait; when in the vicinity of Alden bank, or about 8 miles above Lawrence point, the strength of the tides sensibly decreases, and while a vessel is eastward of a line between this bank and Roberts point, she will be entirely out of the strong tides of the archipelago and the strait of Georgia; it is recommended with the ebb tide to work up on this shore.

LUMMI ISLAND is 8 miles long and very narrow. On its south-western side it is high and precipitous, a remarkable double mountain rising about 1,500 feet abruptly from the sea; there are no dangers off its western side; a small high double rocky islet lies close off the shore, 3 miles from its southern point; foul ground extends from its north-west point in a W.N.W. direction for more than half a mile; and at about 8 cables S.S.W. ½ W. from Carter point, its south-east point, lies Viti rock. A reef extends 3 cables from this rock in an E. by S. direction.

Clark and Barnes islands are two small wooded islands, 2 miles N.W. from Lawrence point; two smaller islets, the Sisters, bare of trees, and a high rock lie immediately S.E. of Clark island. There is a passage 1½ miles in breadth between these islands and Orcas with a depth of 45 fathoms; there is also a narrow channel with a depth of 20 fathoms between Clark and Barnes islands, which a vessel may take if necessary.

The tides set strong about the Sisters, and the best and most direct channel is between Clark and Lummi islands. When taking this channel the north point of Lummi island should not be approached within one mile, as shoal and broken ground extends for some distance off it; Sinclair island kept just open westward of the north-west point of Lummi leads to the westward of this foul ground in 15 fathoms water, and when the east end of Matia island, or Puffin islet close off it, is in line with the north-west point (Bill of Orcas) bearing S.W. ¼ W., a vessel will be clear to the northward of it.

Matia island, 3 miles W.N.W. from Clark island, and one mile eastward from Sucia island (*see* page 103), is one mile in length east and west, moderately high and wooded, and has some coves on its southern side affording shelter for boats; close off its east point is Puffin islet, and extending a short distance eastward of the islet is a flat rock which covers.

Vessels bound through Rosario strait are recommended to pass eastward of Matia.

Alden bank, 3 miles in extent north and south, and one mile east and west, lies in the centre of the northern entrance of Rosario strait; its southern limit is 2 miles north of Matia island, and there is a channel 3 miles in breadth between it and the eastern shore.

The depth of water on this bank varies from 2¼ to 7 fathoms, the bottom is in some parts rocky, with patches of kelp growing on it; in other parts it is sandy, and offers a convenient anchorage for vessels becalmed or waiting for tide. It frequently happens that a vessel having passed to the northward between East point and Patos island, meets the ebb tide, and is carried to the eastward; in such a case it would be desirable to anchor in 7 or 8 fathoms on Alden bank, and thus prevent being set down Rosario strait.

Vessels passing up or down are recommended to pass on the eastern side of the bank; mount Constitution on Orcas island kept just open eastward of Puffin island, bearing S. by E. ¼ E., leads over the eastern edge of the bank in 13 fathoms; and the low west point of Patos island in line with Monarch head (Saturna island), bearing S.W. ½ W., leads over the northern edge in 7 fathoms.*

Whitehorn point is a remarkable bold bluff about 150 feet high its face showing as a steep white clay cliff. It is the southern point of Birch bay, and is 9 miles N.W. from the north point of Lummi island, and 10 miles N.E. by N. from the entrance of the strait of Georgia, between East point and Patos island.

BIRCH BAY is between Whitehorn point and South bluff; the latter, which is a moderately high rounding point, forms the north entrance point of the bay; some large boulder stones stand a short distance off it, and should not be rounded at a less distance than half a mile. The bay trends in a N.E. direction for 2½ miles, and is nearly 2 miles in breadth at a distance of one mile inside the entrance points; the head of the bay dries off a considerable distance at low water, and the 3 fathom line extends 1½ miles off shore in the centre of the bay; it is open to winds from S.S.W. to West. The holding ground is good, and with S.E. gales it affords excellent shelter. A good berth is, in 4 fathoms, with Whitehorn point bearing South, distant one mile; the water shoals gradually from 14 fathoms at one mile off to 6 fathoms between the entrance points; inside this line, 4 fathoms only will be found for a further distance of one mile towards the head of the bay.

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* *See* Views A. and B. on Admiralty chart:—Haro and Rosario straits, No. 2,689; scale, *m* = 0·5 inches.

SEMIAHMOO BAY,* between South and North bluffs, affords good anchorage in from 6 to 8 fathoms water, at about 1½ to 2 miles distance outside Drayton harbour entrance; a good berth is in 6 fathoms, mud bottom, with South bluff bearing S. by E., and Tongue point bearing E. by N. This is always good anchorage, unless with a heavy S.W. gale, when vessels might take shelter in Drayton harbour.

Supplies.—Wild fowl frequent this anchorage in considerable numbers during the winter months.

DRAYTON HARBOUR, at 3½ miles N. by E. from South bluff, is formed by a remarkable low narrow spit over one mile long, which is the termination of the bluff itself. The spit is covered with grass and drift timber, and a few pine trees grow on it; several wooden buildings were erected on it in 1858, and received the name of Semiahmoo town.

Directions.—Off the outside of Tongue spit a bank extends for a considerable distance, and vessels should not approach the spit within three-quarters of a mile until its extreme point bears E. ¼ N., when it may be steered for and passed close-to. There is only a depth of 4 fathoms at low water, in the fairway, at from a half to three-quarters of a mile outside the entrance; the channel is narrow, and no vessel unacquainted with the locality should enter before placing boats or poles on the edges of the shoals; when within, it opens out into a considerable sheet of water, but it is for the most part shoal, drying off from the main shore from a half to one mile.

Anchorage.—The anchorage is in from 7 to 10 fathoms; it is perfectly sheltered, and affords room for 3 or 4 large vessels, as well as several small ones, and on the inside of the spit a vessel might be beached for repairs. The only landing at low water is at the spit end, which is steep-to.

Tides.—It is high water, full and change, at Drayton harbour at 2h. p.m.; springs range 14 feet.

BOUNDARY BAY is an extensive sheet of water between the promontory of Roberts point on the west, and North bluff on the east, which bear S.W. ½ S. and N.E. ¼ N. from each other, and are 7 miles apart. The bay extends in a northerly direction for nearly 7 miles, and is only separated from the south bank of Fraser river by a low delta 3 miles across, intersected by streams and swamps; it is very shallow and dries off

* *See* Admiralty plan of Semiahmoo bay and Drayton harbour, No. 2,627; scale, m = 4 inches.

for a distance of 3 miles at low water, the edge of the bank in 3 fathoms water, extends 4½ miles off the whole of the north shore of the bay.

Vessels should never stand so far to the northward as to bring the white bluff of Roberts point to bear to the southward of S.W. by W., which line of bearing leads more than half a mile outside the shoal edge of the bank; the general depth of water outside this line is from 7 to 15 fathoms, good holding ground, but this anchorage is exposed to all southerly winds, which send in a considerable sea.

Roberts point is the termination of a remarkable promontory which stretches southerly from the delta of the Fraser river. It presents a broad face to the southward, and its southern extreme is a little more than 1¾ miles south of the 49th parallel of latitude; the eastern point of the promontory is a remarkable white-faced cliff, 200 feet high, its summit crowned with trees; from it the land gradually falls to the westward and terminates in Roberts spit, a low shingle point, within which is a small space of level clear land, where a few wooden buildings were erected on the first discovery of gold in the Fraser river, and named Roberts town; for a few months it served as a depôt for the miners, but it has been long deserted.

From this spit the coast trends to the N.N.W. with bluff shores of moderate height for 3½ miles, when it merges into the swampy delta of the Fraser. From most points of view, and particularly from the southward, Roberts point presents the appearance of an island; shoal water and rocky irregular bottom, on which kelp grows in summer, extends for more than one mile E.S.E. from the white face of the point, and vessels are recommended to give it a good berth.

Boundary Mark.—There is a granite monument 25 feet high erected on the summit of the boundary bluff, which is only just visible from the anchorage on account of the trees; it marks the boundary between the British and United States possessions.

Anchorage will be found on either side of the promontory; to the eastward in 9 fathoms, sandy bottom, with the extreme of the white cliff bearing W.S.W. distant 1½ miles, and Roberts spit, the western termination of the promontory, just shut in by the white cliff. To the westward of the spit there is fair anchorage in 8 fathoms good holding ground, with the spit extreme distant one mile, bearing S.E. by E ½ E.; a white flag-staff at the north end of the low land of the point N.E. by E. ½ E.; and the bare bluff of the 49° parallel, or the monument on its summit North; here the edge of the bank will be distant one-quarter of a mile, and a vessel should not anchor any further to the northward, as the Roberts bank trends rapidly to the westward.

Directions.—A vessel should feel her way by the lead cautiously into this anchorage; the bank is very steep outside, and shoals suddenly within; a signal staff at present stands on the end of the spit.

Ships should not lie at this anchorage with strong southerly or westerly winds, but should shift round to the eastern one, or to Semiahmoo bay, and give the southern face of Roberts point a berth of 2 miles in rounding; neither of the anchorages at Roberts point can be considered as more than stopping places, and during winter, vessels should be prepared to weigh at short warning.

Roberts bank, formed by the alluvial deposits of the stream of the Fraser river, extends from the spit of Roberts point in a W. by N. direction for 9½ miles, to the Sand heads or river entrance, and at this point is 5 miles from the shore; it then takes a N.N.W. direction for a farther distance of 12 miles, joining point Grey on the north, as it does Roberts point on the south. The portion of the bank northward of the Fraser is named the Sturgeon bank; it is steep-to, there being depths of from 70 to 60 fathoms at one mile from its edge, shoaling suddenly to 20, and 2 fathoms.

STRAIT of GEORGIA.—Having passed out of Fuca strait by either of the channels now described, when to the north-westward of a line drawn between East point of Saturna island and Whitehorn point (main land) a vessel may be considered well in the strait of Georgia.

General remarks.—Of the channels leading into Georgia strait, Haro strait is the more tortuous; the water is so deep that it would be impossible for a vessel to anchor in the main stream, and for its whole length, the tides, though not stronger, are more varying in their direction.

Rosario strait leads by a very gentle curve almost a straight course into Georgia strait; the depth of water, although considerable, is such that if necessary a vessel might anchor in it; in one part it is somewhat narrower than the narrowest parts of Haro strait, and the tides run with equal strength; it has its sunken rocks and dangers in an equal degree with the Haro, and perhaps the anchorages in point of numbers and facilities for reaching them are equal in both: extreme care and vigilance are called for in navigating either with a sailing vessel; to one with steam power neither offer any difficulties.

To a vessel bound from sea, or from any of the southern ports of Vancouver island to the strait of Georgia, the Haro channel is preferable, while to reach the same destination from Admiralty inlet or Puget sound, Rosario strait is the most direct and desirable. Having entered, however, by either channel, the promontory of Roberts point will be immediately seen with its conspicuous white-faced cliff, appearing as an island. From the northern

entrance of Haro strait it bears N.N.W. distant 11 miles; and is 15 miles N.W. by W. from the Rosario strait.

The general direction of the strait of Georgia is W.N.W., and from a position midway between Saturna and Patos islands, 19 miles on this course should take a vessel abreast the entrance of Fraser river, the Sand heads bearing N.N.E., distant 3 miles; and for this distance the breadth of the strait, not including the deep indentation of Boundary and Semiahmoo bays, is 10 miles. Continuing the same course for a farther distance of 19 miles, will lead between Burrard inlet on the east, and Nanaimo harbour on the west, the entrance of the former bearing about N.E. ½ E. 16 miles, and the latter S.W. ½ W. 7 miles.

The breadth of the strait, after passing the Sand heads of the Fraser river increases to 14 miles; and between Nanaimo and Burrard inlet it is 20 miles broad. The depth is from 70 to 100 fathoms between Roberts point and the southern side of the strait, and farther to the westward between Burrard inlet and Nanaimo, it is 200 fathoms deep in the centre.

Dangers.—The dangers to be avoided in working through the strait of Georgia are, on the northern shore, Roberts and Sturgeon banks: and on the southern, the neighbourhood of East point, and Tumbo island, and the coasts of Saturna and Mayne islands, until beyond the entrance of Active pass. A chain of reefs and rocky islets lie parallel with this shore, in places extending nearly one mile off; and the bottom is rocky and irregular, with strong tides.

Extending one mile E.N.E. from the east end of Tumbo island is a ledge of foul, rocky ground, over which there are very heavy tide rips, and dangerous overfalls. At 7½ cables N.E. ½ N. from Race point (east point of Tumbo island) is a rocky patch of 5 fathoms, about 400 yards in extent, and at about 200 yards to the north-westward of this patch there is a rock with only 14 feet water on it, possibly a shoal head of the 5 fathom patch. This rock lies 7½ cables N. by E. ¾ E. from Race point; and W. ⅜ S., 4 miles from Toe point (Patos island). Orcas Nob kept well open to the eastward of the east point of Waldron island, bearing S.S.E. ¼ E., leads in the fairway between Saturna and Patos islands, 1¼ miles eastward of the rock; and Toe point (Patos island), in line with the north extreme of Sucia island, bearing E. ¼ S., leads nearly three-quarters of a mile to the northward of it.*

Caution.—As before observed (page 51) vessels should when possible pass midway between Saturna and Patos islands, they should on no account give the East point of Tumbo island a berth of less than 1½ miles, and are recommended not to approach the northern shores of the islands lying

* *See* View on chart No. 2840.

between Haro strait and Active pass, within a distance of 2 miles; and they are strongly urged to adhere strictly to this advice.

The light on Georgina point, at the entrance to Active pass, becomes obscured when bearing to the westward of W. ½ S.; and it should be borne in mind that during the night while this light is in sight all the dangers off the northern shores of the above islands will be avoided.

It should also be remembered that the ebb sets to the S.W., through Active pass, and that tide races occur in its northern entrance. Roberts bank is easily avoided. The extreme of Roberts spit, or the tangent of the high trees immediately within it, should not be brought to bear to the southward of East, or E. ½ S.; this latter will lead half a mile outside the edge of the bank. If the weather is thick, when 50 fathoms is struck, a vessel will be getting very near the edge. The entrance to the Fraser river bears N.E. ¾ E., distant 12 miles, from the north entrance of Portier pass.

The Tides, although not nearly so strong as among the Haro archipelago, yet run with considerable strength (3 knots), particularly during the freshets of summer, when the Fraser river discharges an immense volume of fresh water, which takes a southerly direction over the banks, almost straight for the entrance to Active pass. This peculiar milky-coloured water is frequently carried quite across the strait, and is sometimes seen in the inner channels along the shores of Vancouver island; at other times it reaches the centre of the channel only, forming a remarkable and most striking contrast with the deep blue waters of the strait of Georgia.

Below the mouth of the Fraser, the tide is rather the stronger on the southern shore. On the northern side, within the line between Roberts and Sandy points, scarcely any tide is felt; and vessels will gain by working up on that shore with the ebb, where good anchorage can also be found, if necessary.

Allowance must be made for the tides; this is not difficult when after having once entered the strait of Georgia by daylight, and noted which tide was running. In the centre of the strait above Saturna and Patos islands, the strength of the tide varies from one to 3 knots, seldom more, unless close to the island shores, which are swept by the rapid currents out of Gabriola, Portier, and Active passes. Above the mouth of the Fraser there is still less stream and plenty of sea room, the breadth of the strait being nearly 15 miles.

FRASER RIVER,* in point of magnitude and present commercial importance, is second only to the Columbia on the north-west coast

* *See* Admiralty chart:—Fraser river and Burrard inlet No. 1,922; scale, *m* = 1 inch.

of America. In its entire freedom from risk of life and shipwreck, it possesses infinite advantages over any other river on the coast, and the cause of this immunity from the dangers and inconveniences to which all great rivers disembogueing on an exposed coast are subject, is sufficiently obvious. A sheltered strait, scarcely 15 miles across, receives its waters; and the neighbouring island of Vancouver serves as a natural breakwater, preventing the possibility of any sea arising which would prove dangerous to vessels even of the smallest class, unless they ground.

The river, with its numerous tributaries, has its rise in the Rocky mountains, between 400 and 500 miles from the coast in a northerly direction, whence it forces its way in torrents and rapids, through one of the many great parallel valleys which intersect this region, confined by gigantic mountains, with large tracts of country, rich in agricultural resources on either side of them, until it reaches the town of Hope, which is about 80 miles by the windings of the river, in an easterly direction from its entrance.

Above the city of Lytton, which stands at the fork or confluence of the Fraser and Thompson rivers, 55 miles above Hope, many rich deltas occur, or as they are termed by the miners, bars, and among these known as the wet diggings, gold was first discovered in British Columbia.

At Hope, the river assumes the character of a navigable stream; steamers of light draught reach this point and even the town of Yale, 15 miles above it, during from six to nine months of the year. In June, July, and August, the melting of the snow causes so rapid a downward stream that vessels even of high steam power are rarely able to stem it, and during these months numbers of large trees are brought down from the flooded banks, which offer another serious obstruction to navigation. Between Hope and Langley, the latter 30 miles from the river's mouth, there is always a considerable strength of current, from 4 to 7 knots, at times more; but at Langley the river becomes a broad, deep, and placid stream, and except during the three summer months the influence of the flood stream is generally felt, and vessels of any draught may conveniently anchor. The depth is 10 fathoms; the current not above 3 knots.

Midway between Langley and Hope the Harrison river falls into the Fraser, and by it and a long chain of lakes extending in a general N.W. direction a comparatively easy route has been established, by which the upper Fraser is reached at a point just below the Bridge river, in the heart of the gold regions, thus avoiding that difficult and at present almost impassable part of the country between the town of Yale and the

Fountains, by the main river a distance of about 90 miles.* Considerable attention has been attracted of late to the sulphur (hot) springs of Harrison river.†

Vessels of 14 feet draught may enter the Fraser near high water, and proceed as high as Langley with ease, provided they have or are assisted by steam power, and are acquainted with the existing deep water channel, which, it should be remembered, is subject to change. The only difficulty is between the Sand heads and Garry point, the entrance proper of the river, but while there are competent pilots and the buoys remain in their positions, this difficulty disappears. It must be remembered, however, that the tides of the strait of Georgia sweep across the channel of the entrance, and a large ship is recommended to enter or leave with the last quarter of the flood.

The great quantity of deposit brought down by the freshets of summer has created an extensive series of banks, which extend 5 miles outside the entrance proper of the river. The main stream has forced a somewhat narrow channel, in which there is a sharp bend, through these banks, and at its junction with the current of the strait of Georgia, which runs at right angles to it, has caused the wall-edged bank before alluded to, extending to Roberts point on the south and Grey point on the north.

The river is at its lowest stage during the months of January, February, and March. In April it commences to rise from the melting of the snows, and is perhaps 2 feet above its lowest level; the flood stream is strong enough to swing a ship at New Westminster up to the end of this month. In May the water rises rapidly, the river is at its highest about the end of June, and remains up with trifling fluctuations until the end of July or middle of August. During these six weeks the banks are overflowed, and extensive plains above Langley covered for a space of several miles; the strength of the stream between Langley and Hope being from 4 to 7 knots, and in the narrow parts even more. The usual rise of the river at Langley due to these floods is about 14 feet, but it has been known to reach 25 feet.

From the middle to the end of August the waters begin to subside, and in September the stream is not inconveniently strong. September, October, and November are favourable months for the river navigation, as the water is then sufficiently high to reach Hope, and the strength of the current considerably abated. The shallow stern-wheel steamers have got to Hope as late as December; between this month and April, owing to

* The Grand Trunk waggon road from Yale to the centre of the mining district of Cariboo, a total length of 375 miles, and which was completed in 1866, has removed the great difficulties which were formerly encountered on this route.

† The temperature is 164°.

the shoalness of the water and the great quantity of ice formed, navigation, even by these vessels only drawing 18 inches, is attended with great difficulty, and rarely practicable at all. The snags or drift trees which become imbedded in the river also form a serious obstacle to navigation at this season.

In April the steamers commence again to run; in June, July, and August the rapidity of the current is the great obstacle, but these high-pressure vessels, commanding a speed of 11 and 12 knots, frequently accomplish the voyage, though at much risk. The Harrison river route (page 131) obviates some, but not all of these difficulties.

Tides.—At New Westminster the freshets raise the level of the river about 6 feet, but the banks being high no inconvenience is felt, and the strength of the stream is rarely 5 knots, during the winter from 2 to 3; for some miles within the entrance the low banks are partially flooded for a month or six weeks. The rise and fall due to tidal causes is from 8 to 10 feet at springs, between the Sand heads and the entrance of the river proper at Garry point; at New Westminster it is 6 feet, and at Langley scarcely perceptible.

LIGHT.—From an iron pile lighthouse situated on the North Sand head, at the entrance to Fraser river, is exhibited, at an elevation of 52 feet above high water, a *fixed* white light, which should be visible in clear weather from a distance of 12 miles.

Fog bell.—During thick or foggy weather a bell will be sounded from the lighthouse.

Tides.—It is high water at full and change at Fraser river entrance at 6h. 30m., springs rise 7 to 10 feet.*

Directions.—The lighthouse on the North Sand head enables a vessel to pick up the narrow entrance between the Sand heads with accuracy. A large black buoy is placed off the outer edge of the North Sand head, and the edge of the channel inside is marked by buoys, coloured red on the starboard hand (south bank), and black on the port hand (north bank), they are also numbered consecutively; the Sand head buoy can be seen well from a distance of 2 miles.

Coming from the northward, Passage island, at the entrance of Howe sound, kept in line, or just open eastward of a remarkable peak on Anvil island within the sound, bearing N. by W. $\frac{3}{4}$ W., leads $1\frac{1}{2}$ miles clear of the edge of the Sturgeon bank, and about the same distance westward of the lighthouse.

* High water at full and change at the lighthouse on the North Sand head at 4h. 30m., extreme rise 15 feet.—Mr. John Devereux, 1865.

The channel over the sands at the mouth of the Fraser (in 1876–7) continued to scour to the northward, and was more tortuous than formerly; it would be dangerous to attempt to take a vessel to or from New Westminster with a greater draught than 14 feet.

The South Sand head dries at low water, and has frequently a ripple on it when covered; it is marked by a *red* buoy. The least depth in the old (south) channel is 5 feet at low water; as, however, the channel shifts from time to time, the services of a local pilot are absolutely necessary. Approaching the entrance, the buoy moored off the North Sand head should be brought to bear N.N.E., and then steer to leave it about one or $1\frac{1}{2}$ cable's length on the port side, which will lead nearly in mid-channel, the buoys then on the port or north side of the channel should be kept from half a cable to one cable on the port hand.

There is always a great quantity of drift wood on Garry point, and the northern side of the river should be kept aboard for nearly 2 miles, where from 8 to 10 fathoms water will be found; it is then necessary to cross to the south side, and to keep close along it, passing the mouth of the South or Boat channel, and rounding the buoy on the south edge of Sparrowhawk shoal, nearly 2 miles above which, and abreast a clump of high trees, cross again to the north bank to the westward of two low sandy islands; the channel then leads rather along the north side of the river, and with the assistance of the chart will be found sufficiently easy for vessels of 14 feet draught until 6 or 7 miles above Langley.

New channel.—In 1884 a new channel through the sands at the mouth of the river had formed with a depth of 8 feet at low water, summer spring tides. This channel (to the northward of the old one) is marked with black spar buoys numbered consecutively from one to 9.

Directions.—Vessels making for the new channel should, to clear the Sand heads, keep on the leading marks of Howe sound until Garry bush (Leading tree)* bears N.E. by E., when it should be steered for: leave the black buoys one quarter of a cable on the port hand, and after passing No. 9 buoy, steer for No. 15 (fairway buoy), which may be passed on either hand, and thence to Garry point. The Sand heads lighthouse bears S.E. $\frac{1}{2}$ S. from No. 1 buoy, distant $1\frac{9}{10}$ miles.

NEW WESTMINSTER stands on the north or right bank of the Fraser river, just above the junction of the North Fork, and 15 miles in a general north-easterly direction from the entrance proper. It occupies a commanding and well chosen position, being within an easy distance of the entrance, and having great facilities for wharfage along its water frontage, a good depth of water, and excellent anchorage.

* A remarkable isolated tree situated 430 yards N.W. by N from Garry point, but it has been reported to have been cut down.

The river bank is somewhat precipitous in places, and the country at the back is like all the lower parts of the Fraser (unless, indeed, in the immediate neighbourhood of the entrance, where it is swampy grass land, subject to inundation during the freshets of summer), densely wooded; a considerable clearing, however, of the timber has taken place in the vicinity of the town, which now assumes a prominent and thriving aspect, and when the facilities for entering the river and its capabilities are better known, will no doubt rise more rapidly into importance. It has several public buildings of note including a very good hospital, and large canneries which put up some 70,000 cases of salmon each season.*

The site of the former military establishment, one mile above New Westminster, is a most picturesque spot, commanding an uninterrupted view of the Queen's reach, a broad, deep, and magnificent sheet of water. From it to port Moody (at the head of Burrard inlet, and a station of the Canadian Pacific Railway) the distance is 4 miles in a north direction; several good roads exist between the two places, and a branch railway line has been constructed between port Moody and New Westminster; also a waggon road to the outer (Vancouver) harbour of the inlet. The population of New Westminster in 1881 was about 3,000.

Supplies of all descriptions are readily obtained, and salmon in abundance in the season. There are not many facilities for repairs to shipping and machinery.

Coal can be obtained at a price of $6 per ton. About 500 tons are usually kept in stock, but any quantity can be procured at a short notice. Vessels can coal from barges, or they can go alongside a wharf, which extends into a depth of 20 feet at low water.

Trade.—The principal exports are lumber and fish, the value of which in 1886 was $621,575, and the value of the imports, consisting of general merchandise, amounted to $531,264.

The number of vessels that visited the port was 349, of an aggregate tonnage of 144,037 tons.

Pitt river.—At 5 miles eastward of New Westminster is the entrance to the Pitt river, which trends in a general direction from N.N.E. to N.E. for 28 miles, terminating in two remarkable lakes enclosed between almost perpendicular mountains, and navigable to the head for vessels of 14 feet draught, the depth in places being far too great for anchorage. A large tract of low grass land lies on both sides of the entrance of the Pitt, which, however, is generally overflowed, or partially so, during 6 weeks of summer.

Derby or New Langley.—The landing place at fort Langley, is 12 miles above New Westminster in an easterly direction, on the south

* Spring tides rise 6 feet.

or opposite side of the river; the channel between is deep, and there are no impediments to navigation. This spot was first selected as the capital, and as a town site it is unobjectionable, having a considerable tract of good cleared land in its neighbourhood, and all the requirements of a commercial port; the depth of water here is 10 fathoms. Large vessel may proceed with ease 7 miles beyond Langley; the navigation then becomes somewhat intricate, and the current too rapid for any vessels but steamers of light draught and great power.

The North Fork is another entrance to the Fraser, navigable for vessels drawing 6 or 8 feet water, and is generally used by the natives proceeding to or from Burrard inlet. Its junction with the main stream occurs immediately below New Westminster, from whence it runs in a westerly direction, and enters the strait of Georgia through the Sturgeon bank, about 5 miles northward of the Sand heads; a large low partially wooded island (Lulu island) lies in its entrance, and splits the channel into two arms.

In many parts of the North Fork the water is deep, in holes, and the bottom irregular; it can only be considered a boat channel.

BURRARD INLET* is the first great harbour which indents the shores of British Columbia north of the 49th parallel. Its entrance, which is between Grey point on the south, and Atkinson point on the north, is 14 miles N.N.W. from the Sand heads of Fraser river, 21 miles N. by E. ¼ E. from Portier pass, and 22½ miles N.E. ¾ E. from Entrance island of Nanaimo. Howe sound immediately adjoins it on the north, Atkinson point, the northern entrance point of the inlet, being the eastern limit of the sound.

The entrance to the inlet is well marked; Grey point, a long wooded promontory terminating in a rounded bluff, is very conspicuous from the southward, while Bowen island, which lies at the entrance of Howe sound, and may also be said to form the northern boundary of the inlet, is very remarkable; its high, round, and almost bare summit, mount Gardner, reaching an elevation of 2,479 feet, is easily recognized from any point of view. Passage island, small, but prominent, lies in the eastern passage of Howe sound, midway between Bowen island and Atkinson point, and is an excellent mark from the southward; as before observed (page 133), Anvil peak, in line with or just open westward of this island bearing N. by W. ¾ W., leads 1½ miles clear the of edge of the Sturgeon bank, and at night the light on Atkinson point should not be brought to bear westward of North.

Burrard inlet differs from most of the great sounds of this coast in being comparatively easy of access to steam vessels of any size or class,

* *See* Admiralty chart:—Burrard inlet No. 922; scale, *m* = 3 inches.

and in the convenient depth of water for anchorage which may be found in almost every part of it; its close proximity to Fraser river, with the great facilities for constructing roads between the two places, and its having become the terminus of the Pacific and Canadian Railway, likewise add considerably to its importance. It is divided into three distinct harbours, viz., English bay or the outer anchorage; Vancouver (formerly called Coal harbour), above the First narrows; and port Moody at the head of the eastern arm of the inlet.

There is communication by steamer daily and bi-weekly with provincial ports; weekly with San Francisco, and bi-weekly with ports in Puget sound; and by railway to all parts of Eastern Canada, and throughout the United States. There is also telegraphic communication, with main points throughout the province, with the United States, and with Europe.

An electric submarine cable extends from point Grey across the strait of Georgia to Valdes island.

LIGHT.—From a square wooden lighthouse situated on Atkinson point, the north point of entrance to Burrard inlet, is exhibited, at an elevation of 119 feet above the sea, a *revolving* white light, attaining its greatest brilliancy *every minute*, which should be visible in clear weather from a distance of 14 miles.

ENGLISH BAY is more than 3 miles in breadth at the entrance between Grey and Atkinson points, which bear from each other N.N.W. and S.S.E., and carries the same breadth for nearly its entire length or almost 4 miles.

Spanish bank, which extends in a northerly direction from Grey point for three-quarters of a mile, and then curves easterly, joining the south shore of the inlet at the distance of 2 miles within the point, contracts the entrance in some measure, however. This bank is composed of hard sand, and is dry at low water; its edge is steep-to, having off it from 20 to 7 fathoms and then on shore; when covered its existence would not be suspected; there is no ripple on it unless with strong westerly winds, and then only near low water. A red can buoy is moored off its north edge in 7 fathoms. A red can buoy, surmounted by a staff and cage, is moored in 10 fathoms, westward of the bank.*

The head of English bay on the south shore terminates in a shoal arm, named False creek; on the north shore it leads by the First narrows to Burrard inlet. The great volume of water which discharges itself from the upper parts of the inlet through these narrows has scoured out a deep channel on the north side of the outer anchorage, and from 15 to 30 fathoms will be found northward of a line drawn westerly through the centre of the bay.

Anchorage.—There is good anchorage in English bay in 6 fathoms, stiff mud bottom, at about half a mile from the south shore of the bay (off Indian huts), with the extreme of Coal peninsula (a conspicuous perpendicular

* From the buoy the bluff at the entrance to the First narrows bears N.E. ¼ E., and point Atkinson lighthouse N.N.W., distant $2\frac{5}{16}$ miles.

cliffy bluff forming the point of First narrows) bearing N. by E. ½ E., and lighthouse on point Atkinson bearing W. by N. ¾ N.; this anchorage is well protected from westerly winds by the Spanish bank, and is also out of the influence of the current. Anchorage may also be had farther to the eastward, if desired; a remarkable high Nine pin rock stands close off the west end of Coal peninsula, and when this rock is just shut in by the point, bearing N. by W. ½ W., a vessel will be far enough in.

Tides.—In English bay during the winter months from September to March there is what is locally called a "short run out" during the day, and a "long run out" at night. The tide is consequently high during the day, and low at night. The duration of the short run out is from 3 to 4 hours, that of the long 7 to 9 hours. This is entirely reversed during the summer months, when it is high water during the night, and low water during the day. The tides are very complicated, and cannot be depended on, except at full and change of the moon.*

Directions.—Entering Burrard inlet from the southward, Grey point should not be approached within one mile, when the extreme of the bluff bears S.E. ½ S., and the north end of Coal peninsula (which is a conspicuous perpendicular cliffy bluff forming the point of the First narrows) is N.E. by E., steer in E.N.E., which will lead half a mile clear of the Spanish bank; a good look-out being kept for the buoy.

Vessels intending to pass above the narrows must attend to the tides, and a stranger will do well to anchor in English bay before proceeding further up.

The First narrows lie between the bluff of Coal peninsula and the north side of the inlet, where the breadth of the channel is not more than 1½ cables with a depth of from 10 to 12 fathoms; to a stranger the entrance is not easily made out until close in.† A flat composed of shingle and boulder stones, covering with the early flood, extends from one to 3 cables' lengths off the north shore, so that the peninsula bluff must be kept pretty close aboard, rather less than one cable. From the entrance of the narrows, when abreast peninsula bluff, steer for Brockton point for about three-quarters of a mile, or half the distance between the two, and then gradually alter course to pass Brockton point at the distance of about 1½ cables, when an E. by N. course will lead to the Second narrows. To a sailing ship a knowledge of the locality is necessary, as well as a commanding breeze, and the narrows should never be attempted with the full strength of the stream; and vessels must be quick and careful with the helm. Even for a steamer, the strength of the current in the First narrows, necessitates unusual care.

The narrow part of the channel is half a mile in length, when it gradually opens out from 2 cables to half a mile, which is the breadth

* Navigating Lieut. Thompson Maclean, R.N., H.M.S. *Pelican*, 1886.

† F. Townsend, Master, H.M.S. *Scout*, 1866.

abreast of Brockton point, 1¼ miles within the peninsula bluff on the south shore. When past the narrowest part, the south shore should be kept aboard within 2 cables until abreast Brockton point.

Tides.—The strength of the tide in the narrowest part of the First narrows is from 4 to 8 knots. It is high water, full and change, at 6 p.m.; and the rise is 13 feet. The ebb stream commences directly it is high water by the shore, and runs out for two hours after it is low; there is consequently only 4 hours' flood stream.

Burnaby shoal, about 2 cables in extent, marked by kelp, with 9 feet water on it, lies 3¼ cables E. ¼ N. from Brockton point, the kelp, however, is frequently not seen until close upon it. The houses northward of Brockton point open north of that point, lead north of Burnaby shoal, and the pier at Vancouver, bearing S. by E. ½ E., clears it to the eastward. A red buoy is moored on this shoal.

Vancouver harbour, the first anchorage inside the First narrows, is a bight formed by the land falling back from Brockton point. At the western side side of the harbour is the Burnaby shoal, and midway between Vancouver town and Hastings mill the Whiting bank extends 1¾ cables from the shore, with 2¼ fathoms on its outer edge.

Vancouver, a rapidly increasing town which had in 1887 about 3,500 inhabitants, is situated on the east side of Vancouver harbour; it is the terminus of the Canadian Pacific Railway, and trains leave daily for Montreal (*see* page 3). It is in telegraphic communication with Vancouver island and Montreal. There are excellent facilities for beaching vessels. A small steam vessel plies between this town and Moodyville saw-mills on the northern side of Burrard inlet. There is an establishment for herring curing here.

A pier has been constructed half a cable eastward of Buckland point. The depth alongside it at low water is 24 feet.

Vancouver is the centre of the great lumber district which produces the supply for Hastings mill.

At Hastings saw-mill, on the east entrance point of Vancouver harbour, several piers have been constructed for the convenience of vessels loading lumber; there is a depth of 25 feet alongside the largest of these piers.

Trade.—The exports from Burrard inlet consist of lumber, hides, and fish oil. The exportation of lumber for 1886 was 16,679,901 feet, valued at $206,539. Thirty-two ships were employed in this service, the aggregate tonnage of which was 26,302 tons.

The number of foreign vessels that enter the port (exclusive of trading steamers and small craft), is estimated at 51, representing a tonnage of 39,852 tons in the aggregate.

Large quantities of timber are exported to Sandwich islands, Australia, China, and San Francisco; vessels of 1,500 tons go alongside the piers to load.*

* There is regular steam communication between Vancouver town and Japan, China, Sandwich islands, New Zealand, Australia, San Francisco, and ports in Puget sound in connection with the Canadian Pacific Railway; and mails for Australia, China, and Japan are conveyed by this route. The steamers from China coal at Vancouver from a hulk; they call at Esquimalt en route.

Moodyville.—At Moodyville, on the north shore, there is a steam saw-mill, also a grid'ron 180 feet long and 40 feet wide, capable at spring tides of taking a vessel drawing 12 feet; alongside it is a small wharf. Moodyville contained in 1884 about 250 inhabitants, principally employés of the saw-mills. Two steam ferry boats ply between this place and the several other settlements in Burrard inlet.

Hastings, a small village situated on the south side of the inlet, is 3 miles from Vancouver, and is connected with New Westminster by a stage road 9 miles long. It is much frequented during the summer months.

Anchorage.—The best anchorage in Vancouver harbour is in the south-east corner in from 10 to 12 fathoms, mud, with the north extreme of the piers at Hastings mill bearing E. by N., and the landing stage at Vancouver town (a long floating stage) bearing South. This position is out of the influence of the strong tidal streams.

Supplies.—Wood for steaming purposes can be abundantly procured, and also ordinary supplies: water is of bad quality.

Coal is obtained from Nanaimo, from which port it can be shipped at the rate of one dollar per ton. A small quantity can be procured from the retail dealers; price $8 per ton.

A powerful steam tug is available for towing vessels between Juan de Fuca strait and Burrard inlet.

Directions.—From a berth of about 1½ cables off Brockton point steer E. ½ N. keeping the houses north-west of Brockton point open north of that point until the pier at Vancouver town bears S. by E. ½ E., when Burnaby shoal will be passed and the anchorage may be steered for.

Second narrows.—Between the First and Second narrows, a distance of 4½ miles, Burrard inlet trends E. ½ N., varying in breadth from one-half to 1½ miles. In the centre the depth is 36 fathoms, shoaling gradually towards either shore; but Vancouver harbour, or near the south shore, offers the best anchorage.

The Second narrows are similar to the First; a bank of the same description, but more extensive, is caused by the deposit brought down from the high mountains by the numerous streams which flow into the inlet on the north side. This bank is dry at low water, and the breadth of the deep channel, at the narrowest part and for half a mile on either side of it, varies from 1½ to 2 cables, with a depth of from 10 to 20 fathoms. The

channel, however, is straight, and the tides which run from 3 to 7 knots set fairly through it. The only directions necessary are to keep the south shore close aboard, and steer from point to point without going far into the bights which indent the coast on either side of the narrowest part. The great strength of the tide ceases when half a mile from the narrowest part of either narrows.*

PORT MOODY.—The entrance to this snug harbour is 4 miles eastward from the Second narrows, at the head of the eastern arm of the inlet. It is 3 miles in length, and varies in breadth from one-third to half a mile, except at its entrance, where it is only 2 cables across; there are no dangers and there is a uniform depth of water, with good holding ground. The port takes a N.E. by E. ½ E. direction for nearly two miles, and then E. by S. for one mile, terminating in a muddy flat at its head, which reaches within 3 miles of the banks of Pitt river, and about 4 miles from the site of the military camp at New Westminster, on the Fraser. Port Moody was at first chosen as the terminus of the Canadian Pacific Railway, but it has since been decided to make Vancouver the terminus. The line is now open for traffic. Wharfage accommodation for vessels of large tonnage is also provided, the depth alongside which is 30 feet at low water.† A considerable settlement is being formed on the south shore at the head of the bay, which in 1884 contained about 250 inhabitants.

Anchorage.—The best anchorage is in the widest part of the harbour just before reaching the arm which turns E. by S., in from 5 to 6 fathoms, at about half a mile from the trail which leads to New Westminster. Abreast the turning point, and on the north shore, a bank dries off for nearly 2 cables at low water, on which good oysters are found.

North arm, just before reaching port Moody, and 3 miles above the Second narrows, branches off from the main inlet, and takes a general northerly direction for 11 miles. It is entirely different in its character from other portions of the inlet. The depth of water varies from 50 to 110 fathoms, and it is enclosed on both sides by rugged mountains rising from 2,000 to 5,000 feet almost perpendicularly, and down the steep sides of which the melting snow in summer forces its way in foaming cascades, rendering the surface water in the inlet below nearly fresh.

There is scarcely sufficient level land in this arm to pitch a tent, nor is there any anchorage except in Bedwell bay, a narrow creek 2 miles

* A submarine telegraph cable crosses the Second narrows in the narrowest part, marked by three wooden painted posts placed on the mud flat; and the outer of these being on the southern edge of the flat is a good guide for the deep water channel.—Captain H. Rose, R.N., H.M.S. *Triumph*, August 1886.

† The sea worm (*Teredo navalis*) is very destructive here.

within the entrance, on the eastern shore, where 7 to 9 fathoms are found near its head. North arm is nearly one mile wide at the entrance, but one mile within, it is contracted to a little over 2 cables, when it shortly opens out again, and maintains an average breadth of two-thirds of a mile as far as Croker island. There is a settlement on North arm named Richmond with a population of about 250, and there are two salmon canneries there.

Croker island is one mile from the head of the arm, and on both sides of it there are deep but narrow channels; that to the eastward is the widest. The head terminates in a delta of swampy rushes, through which some rapid streams find their way into the inlet from a deep and narrow gorge in a N.N.W. direction.

Water.—During the winter months fresh water is to be obtained in all parts of Burrard inlet, and probably the whole year round there would be no scarcity; in June there is abundance at the creek in English bay, off which is the anchorage.

In Port Moody there is a fine stream close to the oyster bank.

SOUTHERN SHORE OF THE STRAIT OF GEORGIA.*

GABRIOLA REEFS, a dangerous cluster of rocks, covering a space of nearly 1½ miles, some of which cover at half flood, and others having only a few feet water over them, lie 2 miles off the eastern point of Gabriola island, 8 miles below the entrance of Nanaimo harbour. The outer extreme of the reef lies 8 miles N.W. ½ N. from the north point of Portier pass, and 1½ miles E. ½ N. from the easternmost of the Flattop islands (a group of low wooded islets lying close off the east end of Gabriola island). There is a passage inside the reefs, but it is not recommended. When the north extreme of the northernmost Flattop island bears S.W. by W., a vessel will be one mile to the northward of the reefs. Nanoose or Notch hill just open of Berry point (the north-east point of Gabriola island), bearing W. ½ S., also leads one mile to the northward of them.†

A beacon 26 feet high, surmounted by a cage 8 feet in diameter, stands on the largest ledge, which covers at 6 feet rise of tide.‡

Thrasher rock.—At nearly 6 cables N. 15° E. from the above beacon, and about 2 cables' lengths seaward from the end of the Gabriola

* *See* Admiralty chart:—Strait of Georgia, Sheet 1, No. 579; scale, $m = 0{\cdot}5$ of an inch.

† *See* View on Admiralty chart:—Strait of Georgia, Sheet 1, No. 579; scale $m = 0{\cdot}5$ inch.

‡ Mr. John Devereux reports, the beacon has been carried away and probably will not be replaced.

reefs, is a detached rock which dries 1½ feet at low water spring tides, in the kelp which marks the neighbourhood. There is 11 fathoms within one cable's length of the rock on its seaward side, and between it and the Gabriola reefs there appeared to be a depth of about 5 fathoms over a rocky bottom.

Berry point bearing W. ½ S. (well open of Flattop point), leads about one mile northward of Gabriola reefs and Thrasher rock. The entrance points of Portier pass just touching on a S.S.E. ½ E. bearing, lead more than 1½ miles eastward of the reefs.

Buoy.—A black conical iron buoy, marked with the letters G Rfs. in white, is moored in 11½ fathoms, one cable N.E. from Thrasher rock.

Caution.—Westward of Flattop island the shore of Gabriola is bold until near Berry point and Entrance island, when it should not be approached within a long half mile; foul ground extends for some distance eastward from the point of the island.

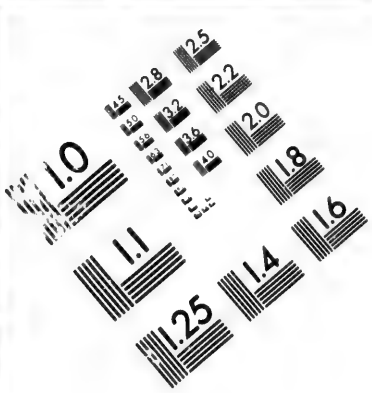
ENTRANCE ISLAND lies half a mile N.N.E., from Berry point, the north-east extreme of Gabriola island. It is rocky, 30 feet high, formed of sandstone, bare of trees, but has some vegetation on it. Vessels passing up the strait bound for Nanaimo should round this island; there is a deep passage between it and Berry point named Forwood channel, a little more than 2 cables in breadth, which steamers or small craft may use; but the south and west sides of Entrance island must be avoided, as reefs and broken ground extend 2 cables' lengths off them.

LIGHT.—From a square, white, lighthouse situated on Entrance island, is exhibited, at 65 feet above high water, a *fixed* white light, which should be seen in clear weather from a distance of 14 miles.

Having rounded Entrance island at the distance of half a mile or more if convenient, the entrance of Nanaimo harbour will be distant 5 miles. There are three channels leading to the harbour, viz., Fairway, Middle, and Inner. Fairway channel is the most convenient for vessels bound to Nanaimo from the southward or eastward; but Middle channel is certainly the safest and most desirable for vessels from the northward.

FAIRWAY CHANNEL, between the shore of Gabriola and Lighthouse island, is the most direct for vessels entering from the southward or eastward.

Lighthouse island is a smooth-topped grassy sandstone island, 3 cables in extent north and south, about 39 feet high, 3 miles W. by S. ¼ S. from Entrance island. A ledge of rocks, 4 cables long in a north and south direction, lies to the eastward of Lighthouse island; with the north end 2¼ cables E.N.E. from the south point of this island, and the south end 4½ cables S.E. by E. from the same point; the least depth on this ledge is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7 feet on its northern edge, and 21 feet on its southern. The ledge is generally covered with streaming kelp, and has a channel of 7 fathoms water between it and the island.*

Fairway channel, between this ledge and Rocky point of Gabriola island, is fully three-quarters of a mile wide; for a distance of 2 cables off the latter point are depths of from 4 to 7 fathoms, rocky bottom, where kelp occasionally grows; this ledge of uneven rocky ground should be avoided. A mid-channel course is recommended, which from a position half a mile off Entrance island is S.W. ½ W. for 3 miles; the water is deep, and the bottom irregular, varying from 15 to 40 fathoms; if to the southward of mid-channel it will shoal to 15 fathoms and shortly to 8 fathoms off Rocky point.

Directions.—Having entered the strait of Georgia, between East point of Saturna and Patos island, a W.N.W. course for 38 miles will lead nearly 3 miles outside Gabriola reefs, and abreast Entrance island, the latter bearing S.W. distant 5 miles. A vessel proceeding through Fairway channel if northward of mid-channel must keep a look-out for the kelp on Lighthouse island ledge; when Lighthouse island bears N.W. steer S. ¼ W., which leads for the entrance of Nanaimo harbour, distant a little over 2 miles. Strangers should be careful not to mistake Northumberland channel for it, which lies in a S.S.E. direction from Lighthouse island, between the high cliffy west coast of Gabriola island and Sharp point, a remarkable narrow projection on the main, and off which, at the distance of half a cable, is a rock which uncovers.

Having passed between Lighthouse and Gabriola islands, there is a good working space of 1½ miles in breadth, between Gabriola on the east, and Newcastle and Protection islands on the west, but the water is too deep for anchorage. The shores of the latter islands should not be approached within one quarter of a mile, as shoal rocky ledges extend off them. Having brought Gallows point (the southern extreme of Protection island) to bear S.W. ½ W., the town will come in view.

A vessel may anchor if necessary with the high-water mark of Gallows point bearing W.N.W., distant one-quarter of a mile, which will be in the fairway of the entrance, but it is difficult for a sailing vessel to pick up a berth here with a strong breeze, as the space for anchorage is confined.

NANAIMO HARBOUR† (on Vancouver island) is formed by Protection island (lying at a little over half a mile off shore) to the eastward, and Newcastle island to the northward; this latter island approaching the

* The southern extreme of this ledge is marked by a *black* can buoy moored in 3½ fathoms, with the southern end of Lighthouse island bearing N.W. by W. ½ W., distant about 4 cables. This buoy is intentionally coloured black to show better regarded as a danger buoy merely.

A *black* buoy is moored 250 yards S.W. by S. from the south point of the island.

† *See* Admiralty plan of Nanaimo harbour, No. 573; scale, $m = 12$ inches; also Nanaimo harbour and Departure bay, No. 2,512; scale, $m = 4$ inches.

shore of Vancouver to within a distance of 1½ cables, and forming a narrow strait affording communication with Departure bay to the northward.

The channels leading into Nanaimo harbour from the eastward are marked by red buoys on their northern sides, and black buoys on their southern sides. These buoys are numbered.*

The entrance to the harbour lies between Gallows point on the north side and a bank of mud on the south side. A rocky ledge extends for 1½ cables' lengths on all sides of the point, and in summer is marked by kelp; a large boulder stands on the ledge off the point, distant 150 yards, and covers before high water. The south side of the channel is the northern edge of the great shallow bay to the southward, which although it does not quite dry in this part, has only 2 or 3 feet on it at low water, and is steep-to. The entrance is here marked by a red conical buoy off Gallows point, and a black buoy on the south side, a little over one cable apart. The harbour thence opens out, and when the banks are covered, gives the idea of being a large sheet of water, but the deep part is limited.

The town of Nanaimo, which is rapidly increasing in importance, contains about 4,000 inhabitants, but it is being continually added to by immigration. Extensive colliery works are in full operation, and the country around possesses exceptional natural facilities. Steamers call here from San Francisco, Portland, and Alaska, as well as from Victoria and coast ports, and there is communication with Victoria by rail.

The communication with New Westminster and Comox is weekly, with Victoria and the way-ports bi-weekly. Between San Francisco and Nanaimo two steamships make two trips a month each. Nanaimo is connected with Victoria, and New Westminster by electric telegraph. The wharf accommodation is excellent. Two or more steamers can be coaled at the same time; the depth alongside the wharf at low water being 28 feet.

Ships are often placed on the beach at the high rise and fall of the tide, affording an opportuntity for effecting any repairs to the hull.

Provision is made for sick seamen, who are either admitted to the Nanaimo hospital, or transferred to the marine hospital at Victoria.

A steam ferry runs between Nanaimo and Departure bay.

Middle bank, 2 cables long in a northerly direction, and half a cable broad, lies in the centre of the harbour, and has a depth of only 3 feet on it in places; it is marked by a *black* conical buoy on its north end, and a *red* conical buoy with globe on its south end.

Beacon rock lies nearly one cable off shore abreast the northern pier; a beacon, consisting of an iron staff surmounted by a ball, has been erected on this rock.

* A *bell* buoy has been placed in Fairway channel, with the southern end of Lighthouse island bearing N.W. by W. ½ W., distant three-quarters of a mile.

Nicol rock, lying 1½ cables E.S.E. from Beacon rock and three-quarters of a cable from the nearest shore, is marked by a buoy, coloured *red* and *black* in *horizontal* stripes.

Directions.—Two narrow winding channels, the North and South, lead into the usual anchorage, which is close off the town, and westward of the Middle bank; both are buoyed in the vicinity of the latter, but no stranger should enter either channel without a pilot.

The North channel lies between the Middle bank (to the southward) and the south edge of the Satellite reef, which is marked by a *red* buoy with staff and ball; steer about West to pass between the latter and the black buoy off the north edge of the Middle bank, then haul close round the southern buoy to avoid the 3-fathom patch, and steer for the mine chimney. The South channel, though of sufficient depth for large vessels, has a somewhat sharp turn at its western end, but is very convenient for sailing vessels leaving with a northerly wind, when they would be obliged to warp out of the North channel.

A *black* conical buoy is moored at the edge of the bank which extends more than 2 cables from the shore at the entrance to Mill stream, to the northward of the town.

Anchorage.—Anchor close off the town in 5 fathoms, midway between the black buoy on north edge of Middle bank and Beacon rock. Vessels can go alongside the wharves.

Supplies.—Beef and mutton may be procured, and the country around abounds in wild fowl and deer.

Ship stores can be obtained; but material necessary for refitting a vessel must be procured from Victoria. The facilities for repairing a ship's hull and machinery are limited, but small work connected with the latter might be executed at the machine shops belonging to the Vancouver Coal Company and R. Dunsmuir & Sons.

Trade.—The chief exports consist of coal, and the imports of general merchandise. The value of the former for the year 1886 amounted to $975,155, and of the latter to $300,270. The number of vessels that entered the port during the year was 239, representing a total tonnage of 197,851 tons.

Coal.—The mines of Nanaimo produce a fair bituminous coal, which answers well for steaming purposes. It is lighter by about 10 per cent. than Welsh coal, and its consumption proportionately rapid. The mines are now in full working, the output for the year 1882 being nearly 300,000 tons, the greater part of which was sent to San Francisco.

The quantity of coal usually maintained on hand is 5,000 tons, and the price is $3¼ per ton. Vessels can coal from lighters alongside at all times.

Newcastle island also produces large quantities, and the mines there are being rather extensively worked.

A small creek on the north side of Douglas coal wharf affords excellent facilities for beaching a vessel, and is frequently resorted to for that purpose. In 1873 spar buoys were placed on the edge of the Patent Slip flat, and on the spit in the middle of the exit passage.

DEPARTURE BAY.*—From Nanaimo the long narrow channel or arm between Newcastle island and the main leads in a N.W. direction to Departure bay. It is 1½ miles in length, and one cable in breadth, with 12 feet at low water, except on a rock which has only 2 feet water on it lying in the centre, 2½ cables N.W. by W. ½ W. from Reef point (the south point of Newcastle island); this rock is marked by a black buoy (No. 11). Vessels of 15 or 16 feet draught may enter Departure bay by this channel at suitable times of tide, but large vessels must enter northward of Newcastle island.

The northern entrance to Departure bay is between Boulder point, the steep cliffy north point of Newcastle island, and Jesse island,† a small island to the northward of it, and lies 2 miles S.W. ½ W. from Lighthouse island; it is 3 cables wide and there is a depth of 20 fathoms in it. Very little less than this depth will be found in any part of the bay, and it is not nearly so sheltered as Nanaimo harbour. When coming from the northward, care must be taken to avoid the reef which extends more than 1½ cables from Horswell bluff, the north entrance point of the bay. A *black* can buoy is moored off Horswell bluff in 3½ fathoms water, at the eastern extremity of the reef.‡

There are coaling piers in the north-west part of the bay, and two additional coaling wharves have been built in the south-west corner. There is a depth of 5 to 6 fathoms at low water alongside all the wharves. Three warping buoys have been placed for the convenience of vessels about to coal. Fresh water can be obtained from Messrs. Dunsmuir's wharf.

The mining village of Wellington has a population of about 1,000, and when required 1,500 tons of coal can be put out in a day.

Buoy.—A red beacon buoy (No. 8) marks the reef in south-east corner of Departure bay; it is moored 1½ cables north-west of the entrance to the channel leading into Nanaimo harbour.

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* *See* Admiralty plan of Nanaimo harbour and Departure bay, No. 2,512; scale, m=4 inches.

† A reef extends from the east end of Jesse island; it is marked by a *black* can buoy, moored in 7½ fathoms, at a distance of 1½ cables eastward of the extreme of the island. A *red* can buoy is also moored in 3½ fathoms westward of Black island, northern side of Departure bay. These buoys are intended to mark the channel inside Jesse island to the North Wellington coal wharves, which is frequently used by vessels proceeding to load.

‡ Coloured black intentionally to show better regarded as a danger buoy merely.

Directions.—Vessels intending to load with coals,* should bring the steep north point of Newcastle island to bear N. by E., and anchor in not less than 18 fathoms off the coal mine, 2 cables' lengths from the shore (or make fast to the mooring buoy until ready to haul alongside the wharf); the bank runs up steep within the above depth, and shoals from 12 to 2 fathoms. Unless anchored well out, a vessel is liable, with N.W. winds, to tail on the bank; and ships are not recommended to lie here after they have got their cargo in. A stranger should take a pilot for the coaling station in Departure bay, either from outside or in Nanaimo harbour.

MIDDLE CHANNEL, over one mile wide, lies between Lighthouse and Five Finger islands; it is perfectly free from danger, and has a depth of 80 fathoms. Passing through the centre of it, a S.S.E. course leads for Nanaimo harbour, between Protection island and Sharp point.

Five Finger island is a bare rugged islet 48 feet high, of about the same dimensions as Lighthouse island, but of trap formation, instead of sandstone; the five hummocks on it resemble knuckles more than fingers.

West rocks.—Four cables S.S.W. from Five Finger island are three smaller islets of similar character and formation, with some rocks about them, which uncover. These islets and rocks occupy a space of half a mile in a W.N.W. and E.S.E. direction; there is a passage 3 cables wide between them and Five Finger island with irregular rocky bottom, the depths varying from 9 to 35 fathoms; it is not recommended, but, if used, Five Finger island should be kept aboard.

Inner channel, 4 cables in breadth, lies between the above islets and the shore of the main, and being more direct, is convenient for steamers or small craft bound to or from the northward; the mid-channel course through it is N.W. Almost in the centre of this channel are the Clarke rocks, which dry 4 feet at low water. A *black* can buoy is moored on these rocks.†

Tides.—It is high water, full and change, at Nanaimo harbour about 5 p.m., and the range of tide is sometimes 14 feet, which is as much as is met with anywhere on the coast, rendering this a most eligible spot for the construction of docks, for which it offers peculiar facilities. This great range of tide only occurs at midnight during winter, and in the daytime in summer. The superior and inferior tides exist here as they do at Esquimalt and among the Haro archipelago.

NORTHUMBERLAND CHANNEL, before mentioned (pp. 94, 144) as lying between Sharp point and the western shore of Gabriola

* The coal is nearly the same weight as Welsh; price $5 per ton; and is put on board very expeditiously, the trucks shooting it straight on board the vessel.

† Coloured black intentionally to show better regarded as a danger buoy merely.

island, runs in a S.E. direction for 1⅓ miles, and then East for 2 miles, when it enters the Dodd and False narrows, the former on the south side of Mudge island, the latter on the north; a rock which uncovers extends half a cable off the extreme of Sharp point. False narrows are shoal with no ship passage, but there is excellent anchorage in Percy bay at their western entrance, in from 7 to 10 fathoms, where vessels may lie to wait the tide through Dodd narrows.

A submarine electric cable crosses Northumberland channel three-quarters of a mile westward of Dodd narrows.

Dodd narrows have been already described (page 93) from the southward; they communicate with the inner channels leading to the southern ports, and save a distance of 20 miles in the passage from Nanaimo to Victoria or Esquimalt, and they are consequently frequented by boats, small vessels, and sometimes by steam vessels of considerable size acquainted with the locality. Strangers are not recommended to use them. Coming down Northumberland channel, look out for the narrow entrance on the south side, and when it bears S.E. steer for it; the tides run at their strongest 8 knots, and there is a very short interval of slack water; the breadth in the narrowest part is 80 yards. The tides in Dodd narrows are about an hour earlier than at Nanaimo, therefore a vessel intending to pass down should be at the narrows an hour before high water at that place, if going through with the first of the ebb; or at two hours before low water if with the last of it.

CHAPTER V.

THE STRAIT OF GEORGIA, FROM NANAIMO HARBOUR AND BURRARD INLET, TO CAPE MUDGE AND BUTE INLET.

VARIATION, 23° 30′ East, in 1888.

THE strait of Georgia,* as already observed, commences at the northern end of the Haro archipelago, and extends in a general W.N.W. direction to cape Mudge, a distance of 110 miles. There are many harbours, both on the Vancouver and continental shores; and several islands, some of considerable size, form other channels, all of which are navigable.

The average width of the main strait westward of Nanaimo is about 9 miles, diminishing at its narrowest part, between Lasqueti and the Ballinac islands, to 5 miles. The general depth of water is great, frequently over 200 fathoms. The tides are not strong, and between Nanaimo and cape Mudge there are few dangers in the way of ships navigating the strait.

The smaller channels on the continental shore are Malaspina strait and Sabine channel, the former lying between the continent and Texada island, the other separating Texada from Lasqueti island.

On the Vancouver shore is Ballinac channel, lying westward of the islands of the same name; also Lambert channel and Baynes sound, the former between Hornby and Denman islands, and the latter dividing both from Vancouver island.

Tides.—The meeting of the tides takes place between cape Mudge and cape Lazo; that is to say, the flood entering by Fuca strait meets that entering by the north end of Vancouver island, within 20 miles of the former cape, generally much nearer, but varying according to the phases of the moon and the state of the winds; and at the point of meeting a considerable race occurs, which would be dangerous to boats: there is generally such a race at the entrance of Discovery passage. It is high water, full and change, at cape Mudge and cape Lazo at about 5 h. 30 m., and the range during ordinary springs is from 12 to 14 feet. At the entrance of the passage during springs the tidal streams attain a velocity of 4 to 6 knots an hour, the flood, or easterly stream, being the strongest.

* *See* Admiralty charts :—Strait of Georgia, sheet 1, No. 579; scale, $m = 0{\cdot}5$ of an inch: also sheet 2, No. 580; scale, $m = 0{\cdot}5$ of an inch.

Winds.—The prevailing summer wind in the strait of Georgia is from N.W., or the same as on the outside coast, and between May and September it blows strong and steady, commencing about 9 a.m. and dying away towards sunset. These winds do not generally extend much below point Roberts, among the Haro archipelago they become variable and baffling, while in the main channels of Rosario and Haro the westerly wind entering the strait of Fuca is deflected to S.W., and vessels running up these channels with a fair wind will almost always find it ahead on entering the strait of Georgia. During winter there is a good deal of moderate, calm, and gloomy weather, but gales from S.E. and S.W. are frequent.

NANOOSE HARBOUR,* at 8 miles westward from Nanaimo, is easily recognised by Nanoose or Notch hill, a remarkable hill 625 feet high, immediately over its north side, showing as a double or notch peak from the southward; the harbour or inlet indents the coast for over 3 miles in a W.S.W. direction and is remarkably clear of danger. The entrance between Maude island and Blunden point is three-quarters of a mile wide, and the width of the harbour varies between 3 cables and over one mile. There are depths of from 30 to 35 fathoms at the entrance, and deep water is carried up to within half a mile of the head, when it shoals more rapidly.

Leaving Nanaimo harbour, and passing out by either channel (Middle channel to be preferred), or being at from one-half to one mile northward from Five Finger island, a W. by S. course, or straight for Nanoose hill, leads for the entrance of the harbour, distant 7 miles.

The shore westward of Nanaimo is free from danger, and at the distance of half a mile 20 fathoms water is found; within this distance it shoals rather suddenly to 5 and 4 fathoms.

Winchelsea and Ada islands, a group of small wooded islands, lie off the north point of Nanoose harbour.

Maude island, small, wooded, and about 100 feet high, is the southernmost of the group, and lies three-quarters of a mile E.N.E. from the north point of the harbour. Vessels working in may stand pretty close to it and to Blunden point, but when inside the latter, a sand-bank dries for a considerable distance off at low water, and the south shore should not be approached within one quarter of a mile.

Entrance rock, 2 feet above high water, lies $1\frac{3}{4}$ miles W.S.W. from Blunden point, extending off a low maple flat on the south side, almost into the middle of the harbour, and contracting the width of the

* *See* Admiralty plan of Nanoose harbour on Sheet of Plans, No. 585; scale, *m* = 8 inches.

passage to 3 cables; within this, the harbour opens out to nearly one mile in width, terminating at a distance of 1¾ miles in a shoal mud flat, which dries at low water more than half a mile, and where quantities of oysters are found.

North rock, the only danger on the north shore, when entering, lies nearly 2 cables from the shore, and has a depth of 5 feet on the outer part.

Directions.—When midway between Maude island and Blunden point, the fair course in is W.S.W. When the east point of Southey island is shut in by the north entrance point, North rock will be passed, and the north shore should be kept rather aboard. Entrance rock should in no case be passed nearer than one cable's length, and if working in, beware of the North rock, and the sand-bank already mentioned as extending off the south shore, and which stretches also for one quarter of a mile westward from Entrance rock; when that distance westward of the rock, both shores of the harbour are clear of danger.

Anchorage.—No convenient anchorage in less than 18 fathoms will be found, until well up towards the head. When Nanoose hill bears North, anchor in 12 fathoms in the centre of the harbour, or as near to either shore as desired. It is a spacious anchorage, and well sheltered from all winds.

There is a convenient nook with a steep shingle beach, where a vessel might be laid for repairs if necessary, on the north side, one mile from the head.

Supplies.—Grouse are to be got here, and fresh water may be obtained from a cove at the head on the north side.

Tides.—It is high water, full and change, in Nanoose harbour, at 5 p.m.; springs range 15 feet.

The COAST for 6 miles westward of Nanoose is fringed with numerous small islands and reefs, the latter generally marked by kelp. The outermost of them, Winchelsea and Yeo islands, extend between one and 2 miles from the land, and beyond these there are no hidden dangers.

Between Maude and Southey islands there is a clear passage of 4 cables, with deep water, by which, if necessary, vessels may enter or leave Nanoose harbour. There are also channels among the smaller groups for coasters; and there is anchorage in fine weather between them at 2 cables from the mainland, generally in 10 fathoms.

Small vessels may find good shelter in Schooner cove at 1½ miles westward of the north point of Nanoose harbour. There is a rock awash nearly in the centre of the entrance, but nearer to the north point.

Winchelsea islands are the south-easternmost of the group off Nanoose, and lie a little over one mile N. by W. from Maude island; they are low, and somewhat less than one mile in extent.

The Grey rock, bare, 12 feet above high water, and rather remarkable, lies 2 cables E.N.E. from the east end of this group.

Rudder reef, with a depth of one fathom on it, lies one-quarter of a mile S.E. ½ E. from Grey rock, and has very little kelp on it. This reef must be avoided by vessels bound westward from Nanoose harbour, and the S.E. end of the Winchelsea islands should be given a berth of at least half a mile.

Yeo and Gerald islands lie westward from the Winchelsea group, and are smaller. They may be safely passed to the northward, at the distance of half a mile.

BALLINAC ISLANDS, two in number, are larger than the groups just described, and lie 2¼ miles off shore. They are about 250 feet high; the northernmost has only two or three trees on it, and its summit terminates in a sharp, bare nipple; the southernmost is wooded. They have the appearance of being one island seen from all points, being only separated by a narrow passage which at the eastern entrance is less than one cable wide, but opens out within, and forms a sheltered cove with anchorage for small vessels in 8 fathoms, close to its southern sandy beach; on the west side this channel is almost closed, and there is no passage into it. The islands are steep and bold on all sides, and are conspicuous after passing westward of Nanaimo; vessels bound through the strait of Georgia would do well to steer for them.

Having passed Entrance island, or gained an offing of one mile from Lighthouse or Five Finger islands, a direct course for Ballinac islands leads well outside all the small islands and reefs which have been described as lying off the coast westward of Nanoose. Before closing them, it must be decided whether to take the main strait to the northward between the Ballinac and Lasqueti islands (which is here 5 miles in width, with a depth of water varying from 100 to 200 fathoms), or to use the Ballinac channel to the southward of them: the latter course saves some distance, and far smoother water is found during strong N.W. winds.

BALLINAC CHANNEL, southward of the islands of the same name, between them and the smaller group which extend off the coast westward from Nanoose, is a safe, clear passage, 1¼ miles in width at its narrowest part (abreast Gerald island); the depth in mid-channel is 136 fathoms, and the shores of the islands on both sides may be approached within one cable's length, if necessary.

To steamers, coasters, or vessels with a fair wind, Ballinac channel is recommended. Large sailing vessels with a foul wind would find it an advantage to make long boards, and pass to the northward of the islands through the main strait.

Cottam reef, the only danger in the channel, has 2½ fathoms water on it, and is generally marked by kelp; it lies on the southern side, and 1¾ miles S.S.W. ¼ W. from the highest part of north Ballinac island, 1⅓ miles W. ¾ N. from the centre of Gerald island, and nearly one mile E. by N. ½ N. from the north end of Mistaken island. The northernmost of the Winchelsea islands kept open of Yeo islands bearing E. ½ S. leads well north of the reef.

NORTH-WEST BAY, 5 miles westward from Nanoose, indents the coast for 2 miles in an E.S.E. direction, making a peninsula of the land which separates it from Nanoose harbour. It is much exposed to N.W. winds and the water in it is very deep; a considerable stream flows into the bay at its western entrance.

Mistaken island, low, wooded, and half a mile long, lies close off its northern entrance point, and 2½ miles S.W. ½ S. from the north Ballinac island.

The COAST.—From North-west bay the land trends, with a slight indentation, nearly West for 19 miles to Denman and Hornby islands, and to the southern entrances of Baynes sound and Lambert channel. This stretch of coast presents no remarkable feature, wooded bluffs, of moderate height, terminating in sandy or shingle points, off which for a very short distance the water is shoal.

The land between Nanoose and the Comox district, a distance of 24 miles, is undulating, and of a moderate height, from the sea-coast to the base of the mountain ranges, a distance of about 4 miles, and although generally densely wooded near to the sea, is lightly timbered a short distance inland, with some patches of prairie land.

QUALICUM RIVER* disembogues 30 miles westward from Nanaimo, and 5 miles eastward from the eastern entrance of Baynes sound. It is a small stream, only noticeable as affording shelter to canoes or boats within its entrance, and as being the terminus of the trail between the head waters of Barclay sound and the eastern coast of the island, a distance of only 13 miles in a direct line.

The entrance of Qualicum river has nothing to mark its position until within one mile of it, when the boulder stones which fringe the whole of this

* A *black* can buoy is moored in 5 fathoms water, about one-third of a mile northward of the river entrance.

coast will be seen to extend somewhat farther off shore than at other points. It lies 17 miles W. by S. from the Ballinac islands, and when the sharp east point of Hornby island bears N. by W., it will be easily made out at the distance of one mile.

Horne lake, from which this stream has its source, is 5½ miles S. by W. from the river entrance; the trail to it is by an easy ascent through a loosely-timbered country. Crossing this lake in a westerly direction for 2½ miles, and ascending a somewhat precipitous range for about 1,500 feet, the waters of Barclay sound are visible to the S.W. about 4 miles; the whole journey can be accomplished in a day. There are passes between the mountains a few miles to the eastward, by which communication with Barclay sound might be established, without encountering any elevation above 700 feet.

Qualicum bay is a slight indentation of the coast, immediately west of the river, where very fair anchorage will be found in 8 or 10 fathoms, at three-quarters of a mile from the shore, with the east point of Hornby island bearing N. ½ W.; the holding ground is good, and northerly winds, which would make it a lee shore, seldom blow with any strength. From N.W. winds it is in a great measure sheltered by the islands, but with those from S.E. a considerable sea will get up, though there would be plenty of room, and no danger of drifting with good ground tackle.

The mountain ranges westward of Nanaimo are of considerable height, and very striking in their general features and varied outlines; most conspicuous amongst them, and midway between Barclay sound and the east coast, rises mount Arrowsmith to a height of 5,976 feet, its remarkable summit terminating in three sharp well-defined peaks, rarely free from snow.

DENMAN and HORNBY ISLANDS lie immediately off the coast, 34 miles westward from Nanaimo; the former is 9 miles long, in a W.N.W. direction, or parallel with the coast, and has an average width of 2 miles, its highest elevation being about 400 feet, and wooded.

Hornby island is about 4 miles across in every direction; over its western side rises rather abruptly mount Geoffrey, a remarkable flat-top hill, 1,076 feet high, sloping gradually down on the east side and terminating in a low bare grassy point; on the eastern side is Tribune bay, affording good anchorage. On both these islands there is a considerable quantity of good land, particularly on the latter, also fresh water; and from the nature of the formation, it is probable that coal seams will be found to exist.

Denman island is separated from the mainland by a good passage called Baynes sound, and Hornby island from Denman by Lambert channel. There is more tide felt in the channel than in the sound; in the former its rate is sometimes 2 knots, the flood coming from the south-eastward. The

prevailing winds are north-westerly, therefore, for sailing vessels from the southward, the main strait east of Hornby island is to be preferred.

BAYNES SOUND, separating Denman island from the mainland, is a narrow sheet of water 18 miles long, with an average navigable width of over half a mile, and with a general depth of from 20 to 26 fathoms, so that vessels may, if necessary, drop an anchor in any part; there are, however, two very fair anchorages, Fanny bay on the south or main side, and Henry bay on the north or island side. At the distance of 14 miles from the eastern entrance of the sound is port Augusta, into which flows the Courtenay river, one of the largest streams in Vancouver island, and in this immediate neighbourhood is a large extent of good clear grass land.

The exit into the strait of Georgia by the north-west entrance of the sound, between the north end of Denman island and cape Lazo, is nearly 2 miles in width, but a remarkable bridge or bar of sand, strewed with large stones, extends the whole way across, and at low water there is as little as 8 feet on it (*see* page 159); during summer it is thickly covered with kelp, which never altogether disappears. The bar is very narrow, and is always smooth; towards high water, vessels of 19 feet draught, by carefully paying attention to the leading marks and buoys, may safely pass either into or out of the strait by this channel.

Buoys.—The east and west entrances to Baynes sound are marked by buoys. A *black* can buoy is moored in 4 fathoms on the north-east side of Kelp bar, and a similar buoy is moored in 3½ fathoms on the south-west side of the bar; these buoys bear, approximately, from each other N. by E. ½ E. and S. by W. ½ W. A course from one to the other leads over the bar in 2 fathoms water. The sand-spit extending from Maple point is marked by a *black* can buoy moored in 3½ fathoms; and the patches off Reef bluff (Kelp reef), on the opposite side of the channel, by a *red* spar buoy, moored in 4 fathoms.

Leading marks.*—On White beach, leading marks consisting of white washed planks attached to trees, have been erected.

These marks when in line bearing S. by W. ½ W. present the appearance of an upper and lower cross, and may be seen from a distance of 6 miles, they lead across the bar at the western entrance, in not less than 12 feet at low water.

Yellow island is small and bare, 80 feet high, and generally of a yellow colour. It lies close off the south-east point of Denman island, is conspicuous, may be seen for several miles, and is a good object to steer for coming from the eastward, as it forms the eastern entrance point of the sound.

Maple point, which forms the western entrance point, is also very conspicuous; it lies 1½ miles S.W. by W. from Yellow island, and is low

* *See* plan of port Augusta on Admiralty chart, No. 585; scale, *m* = 3 inches.

and covered with maples, which in form and foliage bear a remarkable contrast to the pine, the prevailing feature, particularly in autumn and winter, when the leaf assumes a bright yellow or orange colour.

A sand-spit, which dries at low water, and is rather steep-to, extends one-third of a mile north from Maple point,* and the 3-fathom line is the same distance from the shore as far eastward as Qualicum bay ; therefore, neither the coast nor the point should be approached within that distance.

Anchorage.—If desired there is good anchorage outside, in 6 fathoms, with Yellow island in line with Norris reef bearing N.E. ½ N., and Maple point W.S.W. distant three-quarters of a mile.

Directions.—Entering Baynes sound by the south-eastern channel, some care is necessary to avoid a shoal sand-spit extending off Maple point on the south side, marked by a *black* can buoy, as well as some rocky patches and foul ground lying off the Denman island shore, nearly 2 miles westward of Yellow island.

Immediately opposite on Denman island, N.W. from Maple point, is Reef bluff, a high clay cliff, with a bare grassy slope ; off this cliff, for 2 cables' lengths, extend some rocky patches (Kelp reef), marked by a *red* spar buoy, which narrow the width of the entrance between them and Maple point spit to something over 3 cables. When entering, it is recommended to steer in nearly mid-channel, or with the low extreme of Reef bluff in line with the low part of Ship point of Fanny bay bearing W. ½ N., until Maple point bears South, or mount Tremeton is in line with, or just shut in by Boyle point, the south-east extreme of Denman island bearing E.N.E., then steer W.S.W., keeping these marks on astern, which will lead midway between Maple point spit and the patches off the north shore.

Mount Tremeton, the summit of Lasqueti island, is a very remarkable bare, castellated nob, 1,056 feet high. When Maple point bears E. by S., the first reach of the sound will be well open, and Base flat, a low grassy point on the west side of Fanny bay, will be seen open of Ship point ; then steer up mid-channel about W.N.W. Ship point, with the land one mile east of it, shows as two bold wooded bluffs, which should not be approached within 2 cables.

The southern side of the sound between Maple point and Fanny bay for about 4 miles is low, and shoal water extends for a considerable distance off it ; it is recommended not to stand so far over on this side as altogether to shut in Base flat by the bluffs of Ship point just mentioned.

Deep bay.—Maple point from the extremity of the trees turns sharp off at a right angle to the W.S.W. for half a mile, and forms a low sandy spit, in shape resembling the long beak of a bird ; westward of this is Deep

* A *black* can buoy is moored in 8½ fathoms on the end of the sand-spit extending from Maple point, with Yellow island bearing E. by N. ¼ N., Northerly, distant 1½ miles.

bay, in which the depth varies from 15 to 20 fathoms, irregular bottom, but sandy. It is a small, and not very desirable anchorage, and as the shoal extends off the back of the spit for its whole length to the distance of one-third of a mile, the extreme of it, which is steep-to, cannot be steered for until it bears S.E.; if intending to anchor, the best berth is in 14 to 16 fathoms about 1½ cables' lengths east of the spit, and near the centre of the bay.

FANNY BAY, on the southern side of the sound, 4 miles north-west from Maple point, affords a good though somewhat limited anchorage. Base flat, the delta of a considerable stream, having its rise in the Beaufort range of mountains, forms its western point; and Ship point, a bold wooded bluff, its eastern. Entering from the eastward, give Ship point, and the coast of the peninsula immediately eastward of it, a berth of one-quarter of a mile.

Anchorage.—Anchor in 12 or 13 fathoms in the middle of the bay, with Ship point distant a short half mile and in line with the Reef bluff, bearing E. ½ S., which latter will appear as the south-east extreme of Denman island.

The eastern part of the bay dries entirely at low water, and a sandy flat extends a considerable distance off all around the shores, therefore some caution is necessary in anchoring. Small vessels may stand in to 8 fathoms, from which depth it shoals very suddenly off Base flat; a sand-bank dries for more than 3 cables' lengths at low water.

Village point.—From Fanny bay the trend of the sound alters slightly to the northward, taking a north-westerly direction, and increasing gradually in width from one mile to 2 miles, which latter it attains at the north end of Denman island; the general depth of water is 25 fathoms, and both shores are free from danger, with the exception of some rocky or boulder ledges which extend from one to 2 cables off the points. Village point, on Denman island, with a large native settlement on it, is remarkable; it is 2 miles N.W. from Fanny bay, and a sand-spit extends a short distance off it.

HENRY BAY.—Denman island towards its north-west end falls away into a remarkable wedge shape, terminating in a singular sharp beak-shaped extreme called Beak point; the hollow of this beak, on the north-west side of the island, forms Henry bay, which is nearly 6 miles from Fanny bay, and is a safe and convenient anchorage, though, like the latter, it is somewhat limited in size. The shores are moderately high and wooded; its western extreme is a low but steep shingle spit, with one or two trees on it, and a clear beach of the same character extends all around the bay.

Anchorage.—The holding ground is very good, and the anchorage in 9 or 10 fathoms in the centre of the bay, with the western shingle point

bearing N.W., when a remarkable clump of trees on Sandy island will be just open westward of it; here a vessel will be one-quarter of a mile from the beach, where a considerable native village is built. The Indians resort to this bay in large numbers during summer to fish.

Sandy island.—From Beak point a series of sand-banks, some of them above water, others covered, extend in a N.W. direction for a little more than 2 miles. Sandy island, the largest of them, is two-thirds of a mile from the point, and 6 feet above high water, with large boulder stones dispersed over it; there is a good boat passage through at half tide.

White spit.—Two-thirds of a mile north-west from Sandy island is White spit, which almost covers, and is very remarkable from the number of clam shells collected on it, giving it an appearance of a white sandy beach; it is connected with Sandy island at very low tides.

Kelp bar.—The end of the shoal, which occasionally dries in patches, extends two-thirds of a mile north-west from White spit, and from it commences the remarkable kelp bar, or bridge before mentioned (page 156), which connects Denman island with the land about cape Lazo, distant nearly 2 miles. The bar is composed of sand, interspersed with large boulders, which can be seen at low water; great quantities of kelp grow on it during summer, and it is rarely entirely without it. In shape it resembles an hour-glass, very narrow in the centre, not above 3 cables' lengths, and with a depth of 15 feet at low water.* The western edge of this bar is steep, shoaling suddenly, and vessels working to the N.W. through Baynes sound should not stand so far to the eastward as to shut in a remarkable single tree on the shingle spit of Beak point behind the clump of trees on Sandy island, or avoid bringing White bluff (which is 2½ miles southward from cape Lazo and is very conspicuous) to the westward of N.W., and when within one mile of it, to the westward of N.N.W.

To cross the Kelp bar over its narrowest part and in the deepest water, a vessel should stand 2½ miles through the sound, north-westward from Henry bay, until the leading marks on the remarkable white beach (on the western shore, 3 miles West from Beak point) are in line bearing S. by W. ½ W. (*see* page 156), then steer out boldly N. by E. ½ E., or on a direct course from one buoy to the other; two or three casts of 15 feet will be struck at low water, but it will immediately deepen to 3, 4, and shortly 15 fathoms; the same directions will hold good for entering. The white beach may be distinctly seen at 3 or 4 miles distance, but when entering, until it is clearly made out, and the buoys on the bar are visible (*see* page 156), cape Lazo should not be brought to the northward of N.N.W., nor the clump of trees on Sandy island to the eastward of S.S.E.

* A *black* can buoy, named Outer buoy, is moored on the north-east side of Kelp bar, and a similar buoy, named Inner buoy, on the south-west side. (*See* page 156.)

PORT AUGUSTA,* in the north-west corner of Baynes sound, although appearing to be a large sheet of water at high water, has its upper part entirely filled up by a mud flat, which almost dries at low tides, and is formed by the Courtenay river, which flows into it.

The small settlement of Comox, containing about 350 inhabitants, contains all necessary conveniences for settlers. There is a long wooden pier on the north shore with a depth of 14 feet alongside, and at about one mile off, is a Hudson's bay store and Indian village. Some number of English and Scotch farmers are settled in the neighbourhood.

Oil wells have recently been discovered in the vicinity of port Augusta.

Goose spit, a remarkable elbow-shaped tongue of land, projects to the southward and westward from White bluff; it is grassy, with one or two hillocks, and bare, with the exception of two solitary small clumps of trees. Goose spit forms the northern entrance point of the port.

Grassy point, the southern entrance point, is very low and swampy, the delta of a considerable stream; off it, at low water, sand and boulders dry for 2 cables' lengths, and the water shoals suddenly from 10 to one fathom at the distance of 4 cables, leaving a width of less than one mile between the entrance points.

Directions.—Goose spit is steep-to at its western end, but shoal water extends 3 cables' lengths off its southern face; and if working in, the low western extreme must not be brought to the southward of West. Steer in West, passing one-quarter of a mile from the spit, and anchoring in 13 or 14 fathoms, mud bottom, when it bears N.E. distant 3 or 4 cables. A little more than half a mile westward from the spit the water shoals suddenly from 7 fathoms to a few feet.

Rounding the spit end, which may be done very close, a deep cove extends one mile to the eastward, or close up to White bluff; its upper half dries at low water, but there is snug anchorage in its outer part, in 14 fathoms, with the spit end bearing S.E. by S., distant 2 cables. This is an excellent place during a S.E. gale, though no sea to speak of could get up in any part of port Augusta.

Tides.—It is high water, full and change, in port Augusta, at 5h. 0m.; springs rise 12 feet.

Supplies.—The harbour is full of fish and wild duck.

COURTENAY RIVER is a deep and rapid mountain stream, but, on account of falls and other obstructions, is only navigable for a few miles for boats and canoes; it has its rise in mount Washington, from whence it flows in an E.S.E. direction, having a considerable extent of

* *See* Plan of port Augusta on Admiralty chart, No. 585; scale, *m* = 3 inches.

rich grass country on either side, lightly timbered with maple and pine, and in some parts entirely clear. The river is full of salmon and trout at the proper season; the river is bridged over.

Mount Washington is remarkable, and rises to 5,415 feet; it is the westernmost of a range 10 miles in length, terminating in mount Beecher to the east; to the southward and westward of it are several high mountain ranges and peaks from 4,000 to 7,000 feet above the sea, the highest summits being covered with snow all the year round. Between the former and the Beaufort range to the south-east is Bedford valley, through which flows the Puntluch, a stream falling into the Courtenay 2 or 3 miles above the head of port Augusta.

The Beaufort range rise on the western side of Baynes sound, 7 or 8 miles from the coast, and stretch for 12 miles in a W.N.W. and E.S.E. direction, varying in elevation from 4,500 to 5,400 feet; they are very remarkable, presenting 7 or 8 distinct summits, which are rarely free from snow.

This range, together with mount Washington, form the eastern boundary of the great central valley and chain of lakes which extend through the length of Vancouver island from the head of Barclay sound.

LAMBERT CHANNEL, between Denman and Hornby islands, is a safe passage 6 miles in length in a W.N.W. and N.W. direction. It is one mile wide at its southern entrance, gradually increasing to the northwest as it opens into the strait of Georgia; the general depth of water is from 25 to 30 fathoms, shoaling to 16 on either side within 2 cables' lengths of the shore. Coming from the southward, Yellow island marks the western entrance point, while mount Geoffrey, a remarkable flat-top hill, 1,076 feet high, on Hornby island, rises over the eastern side of the channel; either of these may be steered for until approaching the entrance, when W.N.W. is a mid-channel course through. Yellow island and the western shore are free from danger.

Norris rock, on the eastern side, is of considerable extent at low tide, but at high, a mere patch 6 feet above water; it lies 1¼ miles N.E. ½ N. from Yellow island, and three-quarters of a mile E. ½ S. from Norman point, the eastern entrance point of the channel; from the latter point some reefs and foul ground extend nearly 4 cables' lengths towards Norris rock, leaving a narrow passage of 8 fathoms water pretty close to the latter, but it is not recommended.

The eastern side of Lambert channel, between Norman point and Shingle spit, a distance of 2 miles, has two groups of rocks which cover at high water extending nearly 2 cables' lengths off, and the shore should not be approached within one-quarter of a mile; on these rocks

the sea generally breaks when there is any wind, and they are marked by kelp in summer.

Shingle spit is a remarkable low point on the eastern side of the channel, 2 miles W. by N. ½ N., from Norman point; shoal water extends off its extreme, which should be given a berth of one cable's length; temporary anchorage will be found on either side of it, according to the wind; to the northward, in 13 fathoms, at less than 2 cables' lengths from the shore; to the southward, in 9 or 10 fathoms; but one patch of the rocks which cover, before mentioned, lies 4 cables E.S.E. from the spit end.

After passing Shingle spit the width of the channel increases, and there are no dangers which are not visible. On the western side there is anchorage in 12 fathoms off a low maple flat, a little over 2 miles W.N.W. from Shingle spit, with the high boulder of Hornby island bearing N.E., but with N.W. winds it would be exposed.

Two miles north-westward of this flat is Komas bluff, a bold wooded headland, the north-east point of Denman island, from whence the coast trends away to the westward and terminates at the distance of 3 miles in Beak point. This stretch of land is shelving, with kelp patches and shallow water extending some distance off, and vessels should give it a berth of half a mile; indeed, after passing Komas bluff, a good limit in standing to the westward is Shingle spit of Hornby island in line with the south-east point of Denman island bearing S.E. ¼ E.; it is better not to stand so far to the westward as to open out the channel between these two points, in order to avoid the shoal ground in the neighbourhood of Sandy island and the eastern side of Kelp bar; these marks are very prominent, and answer equally for vessels bound through Lambert channel from the northward.

Off the north end of Hornby island is a remarkable boulder rock, 7 or 8 feet high, with smaller ones near it, and vessels should not approach the shore in this neighbourhood within a long half a mile, at which distance are depths of from 7 to 10 fathoms.

TRIBUNE BAY,* on the south-east side of Hornby island, affords good anchorage with all but easterly or south-easterly winds, to which it is exposed. It is easy to enter or to leave, and conveniently situated as a stopping place for vessels bound either way, being 35 miles west of Nanaimo, and 40 eastward of cape Mudge and the entrance of Discovery passage. It indents the island in a W.N.W. direction for 1½ miles, with a width of three-quarters of a mile. At its head are two bays, separated by a jutting point; the northern has a clean white sandy beach.

* *See* plan of Tribune bay on Admiralty chart, No. 580; scale, $m = 2{\cdot}0$ inches.

The eastern end of Hornby island terminates in a rather remarkable point (St. John), grassy, and bare of trees. Off it, in an E.S.E. direction, are 2 or 3 small low islets. Some reefs on which the sea generally breaks extend nearly half a mile outside the islets; these should be given a wide berth, and it is not recommended to pass nearer than half a mile to the north-east coast of Hornby island. The entrance of Tribune bay is one mile west of St. John point; its eastern shores are bold and cliffy, its western low and shelving, with shallow water, and reefs extending a considerable distance off them.

Nash bank, the outermost of these dangers, is a one-fathom rocky patch, which must be carefully avoided. It extends nearly one mile in an E. by S., direction from Dunlop point, and its outer edge lies nearly one mile N.E. by E. from Downes point, the western entrance point, and 1½ miles S.W. by S. from the largest and outermost of the low islets off St. John point. There is a passage three-quarters of a mile wide between it and the eastern side of the bay, but no passage between it and Dunlop point. Norris rock kept in line with Yellow island, bearing S.W. ½ S., leads 3 cables south of it, in 14 fathoms; and when the centre of the white sandy beach at the head of the bay bears W.N.W., steer in for it, which will lead the same distance east of the reef. Yellow island just open south of Norris rock, bearing S.W. ¼ S., leads half a mile south of the reefs off St. John point.

Anchorage.—With a leading wind it is recommended to pass the eastern side of the bay within a short half mile, and to steer up for the white sandy beach as soon as it is open, anchoring with the eastern bluff of the bay bearing E. by N. ½ N., 3 or 4 cables' lengths from the eastern shore, in 9 fathoms, sandy bottom; this berth will be three-quarters of a mile from the white beach at the head, and will enable vessels to leave conveniently on the approach of a S.E. wind, which they should always do. There is anchorage, if desired, in 4 fathoms, much closer in.

CAPE LAZO will be seen after passing the eastern end of Hornby island, from which it bears W.N.W., distant 15 miles. It is a remarkable salient point about 250 feet high, flat and grassy on its summit, but wooded behind, and falling abruptly to the sea in yellow clay cliffs. Although a bold-looking headland, shoal water extends a considerable distance off, and it is recommended not to approach its eastern and south-east sides nearer than 2 miles, as only 4½ fathoms uneven bottom is found at the distance of 1½ miles. Large boulder stones dry off for half a mile at low water. When the pitch of the cape bears S.W., it may be approached to within one mile in 11 or 12 fathoms, and the coast to the westward may safely be passed at that distance.

OYSTER BAY.—From cape Lazo the coast trends W.N.W., is moderately high, and slightly indented with boulder beaches, which makes boat landing attended with danger unless in very calm weather. At the distance of 15 miles is Kuhushan point, the southern extreme of a large but not very deep indentation named Oyster bay; Shelter point, nearly 4 miles N.W. by W. ½ W. from Kuhushan, is its northern extreme.

A reef, which affords considerable protection from N.W. winds, extends half a mile eastward from Shelter point. The entrance to Discovery passage (page 200) is 4 miles north-westward from Oyster bay.

Anchorage.—There is fair anchorage in 10 or 12 fathoms water in this bay for vessels waiting wind or tide. A good berth is a little more than half a mile from the shore with Mitlenatch island bearing N.E. ¼ E., and the highest part of cape Mudge just open of the low extreme of Shelter point bearing N.W. by N.

CAPE MUDGE is one of those peculiar headlands so frequently met with on this coast, and resembles Roberts point and cape Lazo, except that the yellow clay cliff which forms its face is more covered with vegetation. The cape is between 200 and 300 feet high, flat, and wooded on its summit, falling to the westward as it enters Discovery passage with a low boulder point; the high land of Valdes island appears behind it from the south-eastward. A boulder beach extends in a semi-circular form from it to the eastward, and at the distance of 2 miles in this direction the depth is not more than 5 fathoms. The edge of this shoal water is fringed with kelp during summer, and is generally well defined by a tidal line, and sometimes heavy tide rips, which it is recommended not to stand into. Between cape Mudge and Willow point the tide rips at flood are dangerous to small crafts in blowing weather. The western low part of cape Mudge should not be brought to bear westward of W.N.W. when entering or leaving Discovery passage.

Cape Mudge is situated in latitude 49° 59′ 35″ N., longitude 125° 13′ 0″ W.

Directions for Georgia strait.—From the coast of Gabriola island (page 142) abreast Nanaimo, to the opposite shore of the continent, about Burrard inlet, the width of the strait is 14 miles, the navigation free from danger, and the strength of the tide between one and 2 knots an hour. Coming from the southward, mount Shepherd, on the south end of Texada island, is a very remarkable object, and shows as a solitary peaked island standing in the middle of the strait; it is 2,906 feet high, and is plainly seen in clear weather more than 30 miles off.

Proceeding westward, the long and comparatively low island of Lasqueti rises above the horizon, its singular bare turret-shaped summit,

1,056 feet high, presenting an unmistakeable feature. The Ballinac, and smaller islands westward of them, will now soon be made out. When abreast the former, the width of the channel contracts to 4 miles between them and the small island of Sangster off the south-east end of Lasqueti; after which it opens out again to 7 miles, and the rather remarkable flat-topped mount Geoffrey on the west end of Hornby island will be plainly seen. The southern coast of Lasqueti is bold, with no dangers off it which are not seen, except Seal rocks, which cover at half-tide, and lie 1¼ miles west from Sangster island; off its west end are the small groups of Flat and Bare islands, but no hidden dangers. False bay, which indents its west end, is exposed, and not recommended as an anchorage.

The Sisters islets are the next remarkable objects; they are two small black rocks 17 feet above high water, S.W. by S. from the west point of Lasqueti, with a deep-water channel over one mile wide between them and Flat islands. When abreast the Sisters, the main strait turns to the N.N.W. between them and Hornby island for 4 miles, and then resumes its original trend to the W.N.W.: the distance between the Sisters and St. John point, the low bare east point of Hornby island, is 5 miles; the latter, with the small islets off it, should be given a berth of nearly one mile. The Sisters are bold on all sides, but should not be approached too close in calm or light winds, as the tide sets straight past them. Having passed St. John point, the distance to the entrance of the Discovery passage is 38 miles. The strait maintains a uniform width of 9 miles, until near Mitlenatch island, or for 30 miles, the only stopping places being Oyster bay (*see* page 164), 4 miles from cape Mudge, and Gillies bay on the west side of Texada island. The shore of Texada island is bold.

Gillies bay, 10½ miles N. ¼ W. from St. John point, and 2 miles north-west from the Mouatt islets, a small group, which lie nearly one mile from the shore, is easily recognised by a remarkable white patch on its northern point, which is seen for many miles, and shows as two distinct white spots. An anchor may be dropped at one-quarter of a mile from the beach in 12 fathoms, but it is only a stopping place.

Caution.—When standing to the westward towards the Denman island shore, Lambert channel should not be opened out between the south-east end of the island and Shingle spit (page 162), nor should cape Lazo be approached nearer than 2 miles.

NORTHERN SHORE OF THE STRAIT OF GEORGIA.

HOWE SOUND,* immediately adjoining Burrard inlet (page 136) on the north, is an extensive though probably useless sheet of water, the

* *See* Admiralty charts:—Strait of Georgia, sheet 1, No. 579; scale, $m = 0{\cdot}5$ of an inch; also sheet 2, No. 580; scale, $m = 0{\cdot}5$ of an inch.

general depth being very great, while there are but few anchorages. It is almost entirely hemmed in by rugged and precipitous mountains rising abruptly from the water's edge to elevations of from 4,000 to 6,000 feet; there is no available land for the settler, and although a river of considerable size, the Squawmisht, navigable for boats, flows into its head, it leads by no useful or even practicable route into the interior of the country.

The entrance is between Atkinson point (*see* page 136), the north point of Burrard inlet, and Gower point, nearly 12 miles apart. The sound penetrates the continent in a northerly direction for 20 miles, and although of such considerable width for nearly 12 miles of its length, yet it is choked by some large and numerous smaller islands, between which are several ship passages.

Bowen island, the largest and easternmost, lying at the entrance, is remarkable, its highest summit rising to 2,479 feet, being round, smooth, and partially bare, unmistakeably pointing out the entrance from any direction; the island is 7 miles in length in a northerly direction, and more than 3 in width.

QUEEN CHARLOTTE CHANNEL, the easternmost passage into Howe sound, is between Bowen island and Atkinson point; Passage island, only half a mile long, but very prominent from the southward, stands in the centre of the channel, and on both sides of it is a deep-water passage; that to the west 1½ miles in width is the best, the shores of Bowen island being steep and bold; some small rocky islets lie a short distance off the eastern side of the other, but the channel is a good one and one mile wide. A tide-rip is frequently met with off Atkinson point caused by the meeting of the ebb streams from the sound and Burrard inlet.

Snug cove.—At 1¾ miles northward of Passage island, and on the eastern shore, is White Cliff point, and opposite, on the Bowen island shore, distant 1½ miles, is a double-headed cove. Snug cove, the southernmost of these, though narrow, affords excellent anchorage to small craft in 9 fathoms, sheltered from all winds.

Deep cove, the northernmost, is larger, but with a S.E. wind, when anchorage would be most required, a swell would set in. After passing White Cliff point the width of the channel increases to 2½ miles, and 3 miles to the northward is Bowyer island, with a deep ship passage on both sides of it, that to the westward being the widest.

Directions.—Vessels bound to port Graves, which is the principal anchorage in the sound, should pass westward of Bowyer island between it and Hood point, the north point of Bowen island. The latter is a rather remarkable low flat peninsula point, with a small high cliffy island lying

off it, connected at low water; both island and point are bold. From Hood point, Hope point bears W. ¼ S. 3 miles, and after rounding it, a North course leads into the harbour.

Bound up the sound by Queen Charlotte channel, a N.N.W. course leads in mid-channel; pass eastward of White rock, Centre island, and Anvil island, through Montagu channel; the depth of water is 140 fathoms; the eastern shore quite bold.

White rock is a small but remarkable islet 36 feet high; some rocks which cover at high water extend one-quarter of a mile N.N.W. and S.S.E. from it.

Centre island lies midway between it and the south point of Anvil island.

Anvil island is oval-shaped, and 3 miles long, and its summit, Leading peak, 2,746 feet high, is very remarkable, resembling the horn of an anvil pointed upwards. From almost all parts of the strait of Georgia this peak appears as a most prominent object; it has been before mentioned (pp. 133, 136) as an excellent leading mark to clear the shoals off the Fraser river by being kept just open westward of Passage island, on a N. by W. ¾ W. bearing.

Montagu channel, 5 miles above Bowyer island, and between Anvil island and the eastern shore, is one mile wide and over 100 fathoms in depth; passing out of it the sound takes a N. by W. direction for 7 miles to Watts point, when it trends to the north-eastward for a further distance of 4 miles, terminating in a low delta, through which flows the Squawmisht river. The sound carries its depth to the head and shoals from 100 fathoms suddenly to 2 fathoms; the latter depth is close to the mud at the head of the sound, which is so soft, that supposing a vessel to anchor, she would be certain to drag on shore with any wind up the sound.

Anchorage may be obtained off a waterfall on the eastern side of the sound in 20 fathoms water, about 2 cables from the shore and one mile from the entrance of the Squawmisht river, with Watts inner point bearing S.W. by S.*

COLLINGWOOD CHANNEL, to the westward of Bowen island, between it and the group of smaller islands which stud the centre of the sound, is the most direct route to port Graves. At the entrance both shores are steep and bold; the channel takes a northerly direction, and is for 4 miles about one mile wide, the general depth varying from 50 to 100 fathoms. The small islands forming the western side have no dangers that are not visible except Passage rock.

* Lieut. Evelyn Le Marchant, H.M.S. *Wild Swan*, 1885.

A rock which uncovers at very low spring tides lies 1⅛ miles S.S.W. from Hutt island, and one mile S.E. by E. ½ E. from Cotton point, Keats island.*

Worlcombe island is the outermost of the small islands, half a mile long, east and west, and very narrow.

Passage rock, which lies almost midway between Worlcombe and Pasley islands, and covers at half-tide, lies 3½ cables W.N.W. from the eastern point of Worlcombe island, and when working in or out, vessels should not stand so far to the westward, between Worlcombe and Pasley islands, as to shut in the western points of White and Ragged islands behind the low east point of Pasley island.

White island, 1½ miles northward from Worlcombe, is small and round, with some white quartz veins showing through the foliage.

Ragged island is a short distance farther to the north-west, and has four or five very remarkable bare white rocks lying off its eastern end. Having passed Ragged island, the western side of the channel is formed by Keats island.

Keats island is 3 miles long, moderately high, with a bare cliffy summit near its centre. From Cotton point, its eastern extreme, the entrance to port Graves bears N. by E. ¼ E. distant 3 miles.

BARFLEUR PASSAGE lies to the westward of the central group of small islands, between them and Keats island; it is a safe ship channel, but not quite so wide as Collingwood channel.

Working in, it is better not to approach nearer than one-quarter of a mile to Popham island, and the two smaller ones north of it, which form the eastern side of the passage.

At the distance of 2½ miles this passage leads into Collingwood channel. The passages between the small islands are not recommended to be used unless by coasting vessels.

A rock, on which the sea breaks at low water, extends 1½ cables into the channel westward from the second of these islands, and bears North the same distance from the north point of Popham island; otherwise there are no dangers which are not visible.

SHOAL CHANNEL,† the westernmost entrance to Howe sound, is between Keats island and the mainland of Gower point. It is convenient for vessels coming from the westward, and leads to Plumper cove, a snug anchorage on the north-west side of Keats island; Gower point, the

* Mr. John Devereux.

† *See* Plan of Shoal channel and Plumper cove on Admiralty chart, No. 585; scale, *m* = 3 inches.

south-west extreme of the channel, is not very remarkable, but when approaching it a large boulder rock will be seen at its extreme, and a similar one on the shore one-quarter of a mile to the westward of it; a conspicuous cone 900 feet high also rises immediately over the coast, 3 miles within the point on the west side of the channel, and can be seen a long distance off.

The south point of Keats island, which forms the eastern point of entrance to the channel, has, lying close off it, Home island, a small but prominent and thickly-wooded island. From a short distance northward from this island a bar of sand and shingle extends quite across the channel to the steep cliffs of the mainland; the depth of water on it varies from 7 to 18 feet; the least water is on a spit extending 2¼ cables from Keats island, it then deepens to 2¼ fathoms, but at half a cable's length farther to the westward there is a shoal spot of 1¾ fathoms, and there is also a similar depth at 1¾ cables S. ¼ E. from Steep Cliff point; vessels therefore, when entering Shoal channel, should keep rather over to the mainland side about 2 cables' length from it, which may be increased when Home island bears S.E. by E.

Observation point in line with the north end of South Shelter island, or just showing to the westward of it, bearing N.N.E. ⅛ E., leads over the bar in 2¼ fathoms water, which is here only 1¼ cables across, but the passage with this depth is very narrow. Observation point kept just shut in with South point of North Shelter island bearing N.N.E. ½ E., and when Home island bears S.E. by E. kept well open of it, leads over the bar in not less than 2 fathoms; but vessels drawing more than 8 feet water are recommended not to attempt Shoal channel at low water.

The width of the bar in the centre is not over one-quarter of a mile; it does not shoal very suddenly from outside, and a vessel might anchor in 9 or 10 fathoms, sandy bottom, with Home island bearing E. ¼ S.

Two dangerous rocks which uncover at very low water spring tides are reported as lying 3 cables N.N.E. from Steep Cliff point.*

PLUMPER COVE.†—Immediately after crossing the bar of Shoal channel the water deepens to 20 fathoms, and two small islets, partially wooded, and almost joined at low water, will be seen one mile to the N.N.E.; between them and the shore of Keats island is Plumper cove, which is perfectly sheltered from all winds, as, however hard it may be blowing outside, it is generally a calm here. Both shores of the channel are steep, and if wishing to enter, a vessel should pass round the north end of the islets.

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* Mr. John Devereux.

† *See* Plan of Shoal channel and Plumper cove on Admiralty chart, No. 585; scale, *m* = 3 inches.

Anchorage.—Anchor in 8 fathoms in the centre of the cove. There is room to lie at single anchor, but a vessel of any size is recommended to moor, dropping her outer anchor in 10 fathoms when the north end of the islets bear West, and running up the centre of the cove, drop the inner one in 6 fathoms; there is only room for one large vessel, but several small ones could find shelter.

Tides.—It is high water, full and change, in Plumper cove at noon; springs rise 12 feet.

Thornborough channel is a continuation of Shoal channel, and leads up the western side of the sound, between Gambier island and the main. Its direction after passing Plumper cove is N.N.W and at the distance of 6 miles is Woolridge island, rather on the eastern shore; the wider channel lies westward of this island, but there is over 100 fathoms of water through Latona passage to the eastward of it, and a width of one-quarter of a mile. Passing Woolridge island, the arm turns to the north-eastward, and northward of Anvil island leads to the head of the sound; the depth of water is very great in every part, and there is no anchorage above.

Gambier island, lying in the centre of the sound, immediately northward of Bowen island, is almost square shaped, and 6 miles in extent either way. On its western side rise two very remarkable cone-shaped mountains over 3,000 feet in elevation; the southern face of the island is indented by three very deep bays or inlets, but only in the easternmost is convenient anchorage found. Close off the south-west point of the island are the Twins, two small islets; they are the only part of its coast which may not be approached very close.

PORT GRAVES,* the easternmost of the three bays on the south side of Gambier island, is the principal anchorage in Howe sound. It is about 8 miles from the entrance, and may be reached with great facility by either of the channels already described; its entrance will not, however, be very apparent to a stranger until closing Hope point, which forms its eastern side.

The direction of the port, as also of the two deep bays westward of it, is north, and it runs more than 1½ miles in that direction, the width not quite half a mile.

Hutt island, scarcely half a mile long, but very high and remarkable, lies close off the north-west side of Bowen island, and is a good guide to the port when entering by either of the western channels; from it Hope point bears N. by W. 1½ miles; keep the Hope point shore on board on the starboard hand.

* *See* Plan of port Graves on Admiralty chart, No. 585; scale, m = 3 inches.

Tides.—It is high water, full and change, in port Graves at noon; springs rise 12 feet.

Directions.—On the western shore, three-quarters of a mile inside the entrance, a shingle spit extends out for a short distance, which should be given a berth, as shoal water extends half a cable's length off it; when past this spit there is anchorage anywhere in 10 fathoms, but half a mile or more inside it, in 7 fathoms, is the best berth. Vessels entering by Shoal channel, and bound for port Graves, after passing Plumper cove should steer N.E. until near Hope point, and the harbour open, in order not to mistake either of the western bays for it.

The COAST from Gower point, the western entrance of Howe sound, trends W. ½ S. for 18 miles to the entrance of Malaspina strait, and is free from danger. White islet, a bare rock 51 feet high, lies 1½ miles from the shore, 6 miles westward from Gower point, and is remarkable, always showing very white; there is deep water close to it and inside it.

Trail bay.—At 4 miles N.W. from White islet the coast recedes and forms Trail bay. There is a very marked drop in the land at the head of this bay, across which, by a portage of half a mile, the natives carry their canoes into Seechelt arm, one of the many arms of Jervis inlet.

Anchorage may be obtained off the village in Trail bay, abreast a bluff in the north-east corner, in about 15 fathoms. The Indians (Seechelt) are under the care of the R.C. mission, and their chapel is a conspicuous object from seaward.*

Trail islets, four in number, lie a little more than half a mile off the western end of this bay, and if necessary small vessels may drop an anchor inside them in 12 or 13 fathoms water.

TEXADA ISLAND, lying parallel with and on the eastern side of the strait of Georgia, is 27 miles in length, with an average width of scarcely 4 miles. Throughout its whole length stretches a ridge of rugged trap mountains, wooded generally to their summits; at the southern end mount Shepherd reaches a height of 2,906 feet; towards the northern end the range decreases in elevation, but there is scarcely an acre of land fit for cultivation throughout the island. Its shores are steep and bold on all sides, and the land rises abruptly, except at the north extreme. On the north side, 3 miles from Marshall point, there is a boat cove.

Gillies bay, the only anchorage, and that merely a stopping place, is on the south-west side (page 165); good limestone is found at the north end of the island.

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* Lieutenant C. S. Nedham, R.N., H.M.S. *Rocket*, 1882.

Upwood point, the south extreme of Texada island, is rugged and precipitous; stunted pines grow between the crevices of the bare trap rock; the land behind more thickly wooded. Almost immediately over it rises mount Dick, a very remarkable hump-shaped hill, 1,136 feet high, and 3 miles inland is mount Shepherd, the highest summit of the island. A rock which covers lies 2 cables' lengths off the point.

LASQUETI ISLAND lies parallel with Texada at its south-east end, and is separated from it by a channel about one mile wide. It is 9 miles long, with an average width of over 2 miles; mount Tremeton, a singular turret-shaped summit, 1,056 feet high, rising nearly in its centre. On its southern side are several boat coves.

Tucker bay,* on the north side of Lasqueti, and equidistant from either end, is a very fair anchorage. Entering from the westward it is 4 miles from Bare island, and will be readily known by a group of small wooded islands which form its eastern side; its western point is sloping and somewhat remarkable, partially bare of trees. The water shoals rather suddenly from 30 to 16 fathoms.

Anchorage.—The anchorage is in 14 fathoms, with the outermost and westernmost of the small islands bearing N.N.E. and the west point of the bay W. by N. ½ N., which will be within one-quarter of a mile of the shore. With a strong N.W. wind and flood tide, the bay, though safe, would not be a comfortable anchorage; from the eastward, sailing vessels would find some difficulty in reaching it in consequence of the prevailing N.W. winds and the narrowness of the channel at that end.

Small vessels may anchor in the south-east corner, inside the small island on the south shore in 6 or 7 fathoms water, sheltered from almost any wind.†

Tides.—It is high water, full and change, in Tucker bay at 7h. 30m.; springs rise 16 feet.

Sangster island, half a mile long, lies one mile S.S.W. from Young point, the eastern extreme of Lasqueti. There is a deep passage of 70 fathoms between the two, but a rocky ledge with shoal water on it extends off the western point of Sangster island.

Seal rocks, which cover at half-tide, lie a little more than one mile W. ½ N. from the western point of Sangster island, and it is not recommended to pass between the island and the rocks.

Jenkins island lies 3 miles [illegible]twards from Sangster, and close to the south shore of Lasqueti.

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* *See* plan of Tucker bay on Admiralty chart, No. 579; scale, *m* = 3 inches.

† Mr. John Devereux.

Sea Egg rocks, always uncovered, lie 3 cables' lengths off the west end of Jenkins island.

False bay, at 3 miles westward from Jenkins island, and the same distance N.E. by E. from the Sisters islets, is a deep bight but which is not recommended as an anchorage, though small vessels would find shelter in its north-west corner in 7 fathoms.

STEVENS PASSAGE, between the Sisters islets and Lasqueti, is upwards of one mile wide, and perfectly safe and clear. Flat islands, on its eastern side, should be given a berth of one-quarter of a mile, as should also Bare islands, a small group lying off the north-west end of Lasqueti.

SABINE CHANNEL, between Texada and Lasqueti islands, is a good ship passage 9 miles long, in nearly an east and west direction, with very deep water; it is 3 miles wide at the western end, but several high conical islands lying off the north-east side of Lasqueti contract the width at the eastern end, in some parts to three-quarters of a mile. There is also a narrow but deep channel, Bull passage, to the southward of these islands, by keeping close along the Lasqueti shore.

The tides through Sabine channel set at the rate of 2 knots an hour, the flood running to the westward, the ebb to the eastward.

MALASPINA STRAIT is a wide navigable channel, separating Texada island from the mainland. Its general direction is W.N.W. for 30 miles, when it again enters the strait of Georgia between Marshall point (the north-west extreme of Texada) and Harwood island; its southern entrance lies between Upwood point (the south-east extreme of Texada) and the western of the Thormanby islands, and is 4 miles in width. The Texada shore is bold, and almost straight for its whole length, fronted by narrow shingle or boulder beaches.

THORMANBY ISLANDS, two in number, about 500 feet high, almost joined and upwards of 2 miles in extent, are 18 miles from Gower point and form the south-east entrance point of Malaspina strait. Lying close to the mainland, these islands appear as part of it, terminating at their north-west point in a steep clay cliff, off which, at low water, dries a boulder point. Shoal water extends from this point in a north-westerly direction for about 4 cables, and a bank with not more than 5 fathoms water on it borders the northern side of the western island for a distance of from 3 cables to one mile.

From the north point of the eastern island, Tattenham ledge extends half a mile in a north-west direction; this ledge uncovers at the inner part, and has 4 fathoms water on the outer.

Welcome pass, separating Thormanby islands from the main, is a deep but narrow channel, about one mile in length. This passage has not been well sounded, and as sunken rocks exist in its east entrance, it should be used with great caution.*

Buccaneer bay,† formed by the junction of the two Thormanby islands, on their north-west side, extends in a south-east direction for over one mile, and affords good and sheltered anchorage at its head in 15 fathoms.

Caution must be observed when entering, as shoal water extends for fully half a mile from the northern shore of both islands on both sides of the entrance. Tattenham ledge, on the east side of the entrance, will be avoided by keeping the outer of the Surry islands (lying off the east shore within the harbour) in line with Wolf point and the centre of the beach at the head of the bay, bearing S.S.E. ¾ E.

Secret cove.—The eastern side of the strait from Thormanby islands to Francis point, a distance of 6 miles, is somewhat broken. At one mile northward of the entrance to Buccaneer bay is the entrance to Secret cove, formed between Turnagain island and the shore of the mainland. The channel in, between point George (the south-east end of Turnagain island) and Entrance island to the eastward, is half a cable wide with depths of from 7 to 11 fathoms in it. Half a cable S.W. by S. from the west end of Entrance island is a rocky patch which covers at three-quarters flood; it will be cleared by keeping White rock (2 feet high) inside the harbour on its west shore, just open of the north-west shore of Entrance island, bearing N.N.E. ¾ E.

Anchorage.—When past Entrance island, anchorage may be taken up as convenient in 7 to 9 fathoms, midway between that island and Echo island.

Rocky patch.—From Secret cove the coast, which trends to the north-west, is bold-to for 4 miles, at which distance a rocky patch of considerable extent lies one mile SE. by E. from Francis point, and extends nearly the same distance parallel to the shore. The least water found on this patch was 7 fathoms, but less may probably exist. Several small islets lie north of the patch, between it and the shore.

Bargain harbour.—To the northward of these islets is the entrance to this small harbour with depths of 5 and 6 fathoms in it. The entrance

* A shoal of some extent is reported to exist in the eastern entrance to Welcome pass, contracting the passage to about 3 cables. It lies N. 10° W. 2½ cables from the small island on the east side of the bay, N. 76° E. from the north-east point of Thormanby islands, and S. 28° E. 4 cables from the western island in the eastern entrance to Welcome pass:—Navigating Lieut. A. Miller R.N., H.M.S. *Amethyst*, 1876.

† *See* Plan of Buccaneer bay on Admiralty chart, No. 579; scale, *m* = 8 inches.

lies between the Whitestone islands (lying about 3 cables south-east from Francis point) and the islets lying off the shore to the eastward, the largest of which are Flat (the southern) and Green islets. By keeping in mid-channel the harbour may be safely entered.

The head of Bargain harbour communicates with Pender harbour by a narrow passage, which is available for boats at high water.

JERVIS INLET is one of the most considerable of those numerous and remarkable arms of the sea which indent the continent of America from the parallel of Fuca strait as far as lat. 60° N.; it extends by winding reaches in a northerly direction for more than 40 miles, while its width rarely exceeds 1½ miles, and in most places is even less.

Neither from a commercial point of view, as a refuge for shipping, or as a means of communication with the interior of the country, does it appear likely ever to occupy any very prominent place, as it is hemmed in on all sides by mountains of the most rugged and stupendous character, rising from its almost perpendicular shores to heights of 5,000 to 8,000 feet. The hardy pine, which flourishes where no other tree can find soil to sustain life, holds but a feeble and uncertain tenure here; and it is not uncommon to see whole mountain sides denuded by the blasts of winter, or the still more certain destruction of the avalanche which accompanies the thaw of summer. Strikingly grand and magnificent, there is a solemnity in the silence and utter desolation which prevail here during the months of winter, not a native, nor a living creature to disturb the solitude; and though in summer a few miserable Indians may occasionally be met with, and the reverberating echo of a hundred cataracts disturb the silence, yet the desolation remains, and seems inseparable from a scene which nature never intended as the abode of man. The depths below almost rival the height of the mountain summits; bottom is rarely reached under 200 fathoms, even close to the shore, and frequently at much greater depths; there are a few spots where vessels may drop an anchor, but they are either open and exposed, with an inconvenient depth of water, or from the narrowness of their entrance are only adapted to steamers or coasting vessels.

The entrance of the inlet is between Francis point and Scotch Fir point, which are 12 miles apart in a W.N.W. direction. Nelson island lies immediately in the centre, and divides it into two channels, the western-most being the principal one. Both channels can be made out from Upwood point, the south-east extreme of Texada island, which lies directly in front, and serves as a barrier to westerly winds, to which the inlet would otherwise be much exposed.

Agamemnon channel, the eastern entrance to Jervis inlet, is 9 miles N. by W. from Upwood point; after running between Nelson

island and the main in a general northerly direction for 9 miles, it joins the main channel of the inlet; its average width is little more than half a mile, the tides run from one to 3 knots, the depth of water varies from 50 to 100 fathoms and it affords no anchorage. The southern entrance is encumbered by a group of small islands, the centre and largest of which, Pearson island, is one-quarter of a mile in extent, wooded, and 256 feet high; from it the entrance bears N.N.W. Westward from Pearson a little more than one-quarter of a mile are the Channel islets, two or three small islets joined by reefs; and eastward from it at the same distance is Martin island, also very small. Thus there are three passages into Agamemnon channel; the westernmost, between point Fearney, the west point of the channel, and the Channel islets; the middle, between Channel islets and Pearson island; and the easternmost, between the latter and Martin island. The passages are about the same width (over one-quarter of a mile), and have deep water, 20 fathoms being the least found in the middle channel. There is also a passage eastward of Martin island.

Nile rock.—Vessels entering by the western passage, or coming from the westward along the shore of Nelson island, must avoid the Nile rock, which covers at quarter flood; it lies one mile S.W. by W. ½ W. from Fearney point, and the same distance west from the largest Channel islet, is steep all round, and is situated half a mile from the nearest point of Nelson island, off which a reef extends; unless the rock is visible it is recommended to pass outside or southward of it. The southern Channel islet in line with the north end of Pearson island leads on to the rock.

PENDER HARBOUR* is the only anchorage deserving the name with a moderate depth of water to be found in the neighbourhood of Jervis inlet, but its entrance is so encumbered by islands as to render it difficult of access to any but steam or coasting vessels; it immediately adjoins the Agamemnon channel on the south, and lies three-quarters of a mile E.N.E. from Pearson island, indenting the coast for 3 miles in the same direction.

The entrance to Pender harbour may be approached by three passages between the islands lying off the southern entrance of Agamemnon channel. When coming from Jervis inlet by the above-named channel, the passage between Channel islets and Pearson island to the south-west, and Norman point to the north-east is the most convenient, but coming from any other direction it would be better to use either the one between Pearson island and Channel islets, or that between the former island and Martin island; the latter is to be preferred.

* *See* plan of Pender harbour on Admiralty chart, No. 585; scale, *m* = 3 inches.

Williams and Charles islands lie immediately across the entrance, forming three channels; that to the northward between Williams island and the main (Henry point), the north entrance of Pender harbour is not one cable in width, but it is the best and has a depth of 20 fathoms.

Entering the harbour between Williams and Charles islands the channel is only 100 yards in width, with 7 fathoms water, and a rock which covers at three-quarters flood lies more than half a cable N.N.W. from the east point of the latter island.

Skardon islands, two in number, lie 2½ cables' lengths eastward from Williams island; pass on either side of them and steer up the harbour, which is over one-quarter of a mile in width, and the depth will soon decrease to 12 fathoms. One mile within the entrance a peninsula extends to the south from the northern shore; pass between its southern point and Mary island, a little over one cable apart, with a depth of 12 fathoms.

Anchorage.—Anchor in Gerrans bay, one-quarter of a mile to the southward of the peninsula, in 6 or 7 fathoms; there is also good anchorage in Garden bay, just eastward of the peninsula, and abreast an Indian village, in 5 or 6 fathoms. The latter is the more suitable for a large ship. Pender harbour extends three-quarters of a mile above Garden bay by a very narrow passage with only 2 fathoms in it, and then opens out with a depth of 7 fathoms. To the eastward of this narrow passage is Gun Boat bay, where small vessels may anchor in 7 fathoms. The space in this anchorage is somewhat confined, as is also the case with both Gerrans and Garden bays.

Tides.—It is high water, full and change, in Pender harbour at 6h. 0m.; springs rise 12 to 14 feet.

The Western entrance to JERVIS INLET is between Alexander point, the south extreme of Hardy island, on the east, and Scotch Fir point on the west. The points are not remarkable, but the opening is easily made out; it is nearly 2 miles in width, and takes for a short distance a N.N.W. direction. Scotch Fir point is rocky, and has two small islets lying close to the westward of it, which, like the point itself, are covered with stunted pines. Hardy island lies close to and is nearly connected with Nelson island; Blind bay between them is useless, and its entrance choked by small islands.

Thunder bay, formed on the western side 1½ miles above Scotch Fir point, is one of the few places in Jervis inlet where a vessel may drop an anchor, and being near the entrance is likely to prove convenient. The bay is about half a mile deep, with a sandy beach at its head, off which, at the distance of 2 cables, 17 fathoms water will be found; immediately

outside it there are 30 fathoms, and the lead then drops suddenly to a great depth.

One mile within Scotch Fir point Jervis inlet takes a N.E. by E. direction for 12 miles, when it forms a junction with Agamemnon channel at the northern end of Nelson island. Just before reaching this point, Hotham sound, a wide opening, trends to the N.N.W., terminating at the distance of 7 miles in a double-headed bay; the water in every part of it is too deep for anchorage.

NELSON ISLAND, in the middle of the entrance to Jervis inlet, is 10 miles long in a northerly direction, and about 4 or 5 miles wide; its shores are much broken and indented by several bays, in none of which, however, can anchorage be obtained in consequence of the great depth. The island is mountainous, the summits ranging from 500 to 1,500 feet in height. Cape Cockburn, its south point, is of white granite, about 80 or 90 feet high, covered with a few dwarf pines; a rock lies one cable south from it.

Captain island, north of Nelson island, and separated from it by a narrow passage, is about one mile in extent, rocky, and steep-to.

One Tree islet, off the east side of the inlet, 1¼ miles north-east from Captain island, is small, and has a single tree on its summit, which is very conspicuous; its height is about 50 feet. A rock awash at low water lies one cable off its east side; but the islet may be approached close on the west side; just within it, on the east shore, is a bight where a coasting vessel may drop an anchor.

PRINCE of WALES REACH.—Dark cove, on the west side of Jervis inlet, within the Sydney islets, is 2 miles north from Captain island, and 12 miles from the entrance. The cove is only about 2 cables in extent, but affords a snug anchorage in 15 fathoms, and is the only place in the inlet deserving of that name; a vessel of considerable size could moor within it. There is a clear deep passage one cable wide into this cove on both sides of Sydney islets.

Vancouver bay, on the east side of the inlet, 19 miles from the entrance, is about half a mile in extent, and of square shape. From its head, which is low, a considerable valley extends to the eastward, but the shores on both sides are craggy and precipitous, and the bay is too deep to afford anchorage, there being 60 fathoms within one cable's distance of the bank, which extends a short distance from its head.

PRINCESS ROYAL REACH.—Deserted bay, also on the east side of the inlet, at the termination of Princess Royal reach, and about 37 miles from the entrance, is small, and affords an indifferent anchorage in its eastern part near the head in about 16 fathoms, exposed

to west and south-westerly winds. A valley extends from the head of the bay to the north-east, through which a trail runs to the Lillooet lakes on the Fraser river, and is much frequented by the natives in the summer season.

QUEENS REACH.—The head of Jervis inlet terminates in a patch of low swampy land through which flow some small streams, and a bank dries off about one cable; it does not afford any anchorage, there being 25 fathoms within half a cable of the outer edge of the bank. A remarkable peak, mount Victoria, rises 2 miles north of the water's edge to a height of 7,452 feet, and is a very conspicuous object on approaching the head of the inlet.

At the head of Jervis inlet there is a valley by which the Indians go to Clahoose (Desolation sound) in two days.

Princess Louisa inlet, on the east side of Jervis inlet, 5 miles below the head, is narrow, and about 4 miles long in an E.N.E. direction; it is connected by a narrow gorge to the main inlet, which at low tide becomes almost a waterfall, rendering it impossible for boats to enter except at high water; inside, like Jervis inlet, it is deep, and the mountains on both sides rise to 7,000 and 8,000 feet.

SEECHELT ARM, the entrance to which is on the east side of Jervis inlet, one mile north of Agamemnon channel, is an extensive arm of the sea, penetrating the land for 17 miles in a south-easterly direction towards the strait of Georgia, and only separated from the latter by a low neck of land, 1,100 yards wide, forming an extensive mountainous peninsula to the westward, called Seechelt peninsula. On the east side of the arm, at a distance of 7 and 11 miles from its entrance, are two smaller branches, Narrows arm and Salmon arm, extending to the north-eastward for upwards of 10 miles.

Rapids.—The arm at 3 miles within its entrance contracts in breadth to less than one-third of a mile, and is partially choked up with rocks and small islands, which preventing in a great measure the free ingress and egress of the tide, cause most furious and dangerous rapids, the roar of which may be heard for several miles. These rapids prevent any vessel, or even boat, from entering the arm, except for a short time after high and low water, when the tide slackens for a very limited period; it would, however, be hazardous for any vessel, except a very small one, to attempt to enter at any time, although there is a passage with from 4 to 7 fathoms between the islands and the south or peninsula shore.

The shores of the arm, except near its south part or head, are high and rocky, and it is a useless sheet of water, except as regards fishing, as in the summer season the natives catch great quantities of salmon there.

Tides.—It is high water at full and change in Jervis inlet at 6 hours, the rise and fall being about 14 feet; within the Seechelt arm the rise and fall seldom exceeds 6 or 7 feet.

The tidal streams are, except near the entrance of Seechelt arm, weak and irregular and influenced by winds.

HARWOOD ISLAND, off the west entrance to Malaspina strait, 1½ miles from the continental shore and about 3 miles north-west from point Marshall, is 2½ miles long in a northerly direction, 1½ miles wide, from 150 to 200 feet high, flat, and thickly wooded. It is bordered by a sandy beach, and at its north point is a low grassy spit. There is deep water between the island and the shore.

Rebecca islet, lying midway between point Marshall and Harwood island, is of small extent, and 5 feet above high water.

Bare islet, one mile W.S.W. from the south end of Harwood island, is a bare, yellow, cliffy rock, about 2 cables in extent, and 30 feet above high water.

The COAST.—Westward from Jervis inlet, the north shore of Malaspina strait takes a westerly direction for 11 miles, terminating at Grief point; for a considerable distance inland it is low, and bordered by a sandy beach; there are no off-lying dangers that are not seen.

From Grief point the north or continental shore of the strait of Georgia trends W.N.W. for nearly 20 miles almost straight to Sarah point, the south-east entrance point of Desolation sound. Throughout the whole distance the coast is low, not rising to more than 500 or 600 feet, and but slightly indented. There is a fresh-water stream of considerable size 4 miles west of Grief point communicating, at about 2 miles from the shore, with a lake which extends some 40 miles northward towards the head of Toba inlet.

Claamen.—At one mile farther westward a vessel may anchor in fine weather for night or tide at a distance of 3 or 4 cables off shore near the coast abreast Harwood island in 12 to 13 fathoms. Anchorage must be taken up with caution as flats extend a considerable distance off shore. When anchoring do not shut in the north shore of Savary island.*

Navigating along this coast between Grief and Sarah points, a vessel will avoid danger by keeping not more than half a mile off shore as far as Hurtado point, and passing northward of Harwood and Savary islands. When past Hurtado point, a vessel ought to steer more to the westward, and pass southward or westward of the White, Double, and Powell islets.

SAVARY ISLAND, nearly 6 miles W.N.W. from Harwood island and one mile from the continental shore, is 4 miles long in a W.S.W. direction, and less than one mile wide. A sandy beach strewed with huge boulders

* Lieutenant C. S. Nedham, R.N., H.M.S *Rocket*, 1882.

surrounds it, and extends a considerable distance off its north and west sides, which should not be approached nearer than half a mile; these boulders extend a greater distance from the south side of the island, which side, therefore, should not be closed nearer than three-quarters of a mile. The height of the island varies from 80 to 120 feet, and the south side is faced by some remarkable white sandy cliffs, very conspicuous from the south-east; its east extreme is a granite cliff, steep-to. There are severa clear grassy patches on the island, but the soil is poor and sandy. A sandy bar or ledge, of one to 2 fathoms water, extends from its west point to Hernando island.

Hurtado point, on the main abreast Savary island, is about 250 feet high, bold and cliffy. There are 37 fathoms water in mid-channel between it and the island.

Mystery rock, $2\frac{3}{4}$ miles S.E. $\frac{1}{2}$ E. from the east end of Savary island, is a patch which uncovers 4 feet at low water. From the rock shoal patches of from one to 3 fathoms extend towards the east end of Savary island. Vessels therefore in navigating this locality should observe great caution when going between Savary and Harwood islands, but by keeping within half a mile of the continental shore, and also by keeping Grief point open to the northward of the north extreme of Harwood island, this danger will be avoided. Vessels working up or down the strait of Georgia, when standing to the eastward between Harwood and Savary islands should not shut in the south end of Hernando island with the south end of Savary island.

RAGGED ISLANDS, lying close to and parallel with the continental shore, are a rocky group of small islands $2\frac{1}{2}$ miles long and 3 cables wide; their south-east part is about $2\frac{1}{2}$ miles north-west from Hurtado point, and some rocks extend 4 cables from their north-west extreme.

White islet, one mile to the south-west from Ragged islands, is a very remarkable, bare, white granite, rock, about 70 feet high. A rock which uncovers at low water lies one cable's length east from it, but in the middle of the passage between the islet and Ragged islands is a depth of 37 fathoms.

Double islets, half a mile west from the north-west part of the Ragged group, are small, and about 90 feet high, with a single tree on each of their summits.

Powell islets, one mile north-west from Double islets, are two in number, small, about 90 feet high, and covered with a few stunted bushes and trees; the westernmost islet is steep-to on its north and west sides.

Sarah point, at 20 miles W.N.W. of Malaspina strait, may be called the north-west entrance point of the strait of Georgia. It is a

rounded, rocky point, sloping gradually to the sea from a height of about 750 feet, at a short distance within it. The coast here turns sharply round to the eastward into Malaspina inlet.

Sarah point is situated in latitude 50° 3′ 40″ N., longitude 124° 52′ 0″ W.

Mitlenatch island lies 16 miles N.W. from cape Lazo, is half a mile in extent, 200 feet high, bare and peaked. Between it and the Vancouver island shore, distant nearly 6 miles, is the fair channel to cape Mudge and Discovery passage.

HERNANDO ISLAND, 2 miles west from Savary, and 3 miles N.N.E. from Mitlenatch island, is about 2 miles in extent, flat, thickly wooded, and from 120 to 170 feet high. A ledge composed of sand and huge boulders extends two-thirds of a mile from its south-east point, and there is only a depth of 1¼ fathoms in the channel between it and Savary island. From the west side some rocks extend off upwards of 2 cables in many places, and it should not be approached nearer than half a mile in passing.

Stag bay, on the north side of Hernando, affords anchorage in 12 to 15 fathoms at a distance of about 2 cables' lengths off shore, and is useful as a stopping place for vessels bound to Bute inlet or Desolation sound. There is a small fresh-water stream in the east part of the bay.

Tongue point, the north-west extreme of Hernando and of Stag bay, is a low sharp sandy point or spit, covered with a few trees, steep-to, and may be approached to 50 yards.

Anchorage.—Vessels should anchor at about three-quarters of a mile from this point, with the east part of Twins islands bearing N. by W.

Baker passage, to the northward of Hernando island and leading from the strait of Georgia to the entrance of Desolation sound, is about 3 miles long in a north-easterly direction, and one mile wide in the narrowest part, being bounded on the north side by Cortes and Twins islands. The only danger is at its north-west entrance point, off which a boulder ledge extends upwards of 3 cables' lengths in a south-easterly direction.

Tides.—It is high water, full and change, in Baker passage at 6h. 0m.; springs rise 12 to 14 feet.

Twins islands, about 1½ miles north from Hernando, are two rocky islands connected by a sandy beach at low water, covering an extent 2 miles long in a north-westerly direction, and about one mile broad; their south shore is steep-to and may be approached to within a distance of one cable. The northernmost Twin is 490 feet high, rising to an almost bare summit in the centre; the southern one is about 300 feet, and

on both of them are numerous indications of iron and copper ores. None but small craft should go north of these islands. Some small islets lie a short distance off their north side.

Centre rock, which covers at one-quarter flood, is in the middle of the passage between Twins and Cortes islands.

To avoid the ledge off Reef point, (the south extreme of Cortes island), when entering Baker passage from the strait of Georgia, bring Tongue point, the north-west extreme of Hernando island, on a N.E. bearing, and steer for it, passing about one cable's length off, then keep midway between Hernando and the Twins.

Blind creek, on the east side of Cortes island, 1½ miles north from Twins islands, is a basin of about 4 cables in extent, with from 7 to 9 fathoms water; there is, however, in the entrance, a rock which covers at one-quarter flood, rendering the place useless as an anchorage.

Three islets, lying half a mile off the entrance of Blind creek, are three bare white rocks about 60 feet high, almost connected at low water; there is a depth of 27 fathoms at a distance of 2 cables eastward from them.

LEWIS CHANNEL, off the entrances to Desolation sound between Cortes and Redonda islands, to the westward of the latter, runs nearly straight upwards of 12 miles in a north-westerly direction, and varies in breadth from one mile to 3 cables, being widest at the south-east part; its shores are generally rocky, low in the south part, but rising gradually to the north-west, steep-to and everywhere free from danger.

Turn point, the south-west entrance point of this channel and the east extreme of Cortes island, is about 100 feet high, rocky, and covered with a few stunted trees; the coast turns suddenly from north-east to north-west around it, and close in shore to the northward of the point are two islands forming a small boat cove.

Tides.—In Lewis channel the tides are weak and irregular, seldom exceeding 2 knots, and are influenced by the winds.

SQUIRREL COVE,* on the west side of Lewis channel, 4½ miles from Turn point, is a small land-locked basin of 6 to 7 fathoms water, with room for a vessel of considerable size to lie at single anchor. It is entered by a narrow passage about 130 feet wide, with 5 fathoms water, on the west side of the island (Protection island) in the entrance, which protects the cove from the southward. The shores are moderately high, and though much broken, very picturesque and fertile in appearance. To the northward of, and connected at high water with the cove, is a long narrow lagoon, stretching to the north-west nearly across Cortes island.

* *See* plan of Squirrel cove on Admiralty chart, No. 580; scale, *m* = 3 miles. It is nigh water, full and change, in Squirrel cove at 5h. 0m.; springs rise 12 feet.

Squirrel cove can only be entered by steamers, or sailing vessels with a fair wind, and the chart is the best guide. There are no dangers whatever within or near it.

Boulder point, the south-east entrance point, is low, and may be easily known by a large boulder on its west side; a rock, which covers, lies nearly one cable south from it, but the point may be rounded at a distance of 2 cables.

Northward from Squirrel cove the west side of Lewis channel becomes more rocky, and gradually increases in height; it takes a northerly direction for one mile to Junction point, and then trends to the north-west for 7 miles, the channel ending at Bullock bluff, the north extreme of Cortes island. At 3½ miles from Junction point the depths in the channel shoal to 27 and 30 fathoms, and a vessel may anchor in about 18 fathoms at one cable's distance from the west shore.*

MALASPINA INLET, 1½ miles E.N.E. from Sarah point, and 1½ miles E. by S. from Kinghorn island, penetrates the continent 8 miles in a S.E. by E. ½ E. direction, forming with the strait of Georgia a peninsula about 2 miles wide; it has one good harbour, and several arms, at the head of some of which there is anchorage. The inlet at its entrance between Georgina point and Zephine head, the west point of Gifford peninsula, is 4 cables wide, which is its general width, until abreast Scott point on the northern side, a distance of 2 miles, when it is contracted to 2 cables; this portion of the inlet, however, is so studded with islands and rocks as to considerably narrow the navigable channel. The depths in it vary from 30 fathoms to 6 fathoms. At Scott point the inlet for three-quarters of a mile takes an easterly direction, and then between Hillingdon point and the north end of Coode peninsula widens out to one mile and again turns to the south-eastward for 2¼ miles, and, under the name of Oke over arm, continues in the same direction for a farther distance of 2½ miles, the width gradually decreasing to 3½ cables. To the eastward of Coode peninsula the water becomes very deep, but at the beginning of Oke over arm it shoals to 40 fathoms, and gradually to 5 and 6 fathoms at the distance of nearly 2 cables from its head.

Freke anchorage, in 12 or 14 fathoms water, is at the head of Oke over arm, about 3 cables from the edge of the flat that extends 2 cables from the head of the arm, just above Lucy rock, which lies very close to the south-western shore.

Josephine islands, about three-quarters of a mile within the entrance of Malaspina inlet, with a passage on both sides, are two in number and almost joining each other; the north-western one is very small, the other

* Vancouver's ships anchored here in 1792 while exploring this part of the coast.

is about 1½ cables long in the direction of the inlet, and not more than half a cable wide. The passage between them and the south-western shore is one cable in width, and that to the north-eastward 1½ cables, but as the Cavendish rock lies nearly in the centre of the south-eastern entrance of the latter, the former, in which the depth of water is not less than 6 fathoms, is to be preferred.

Cavendish rock, awash and marked by kelp, lies 1½ cables E. by N. from the south-east end of Josephine islands, and is a danger that must be avoided when passing eastward of those islands.

Cross islet, distant 1½ cables from the northern shore of the inlet, and 2¾ cables E.S.E. from Josephine islands, lies on the northern side of the channel; it is small, not more than half a cable in extent.

Rosetta rock, the principal danger in entering Malaspina inlet, is awash and lies nearly one cable S. by W. from Cross islet. The south-western point of Josephine islands in line with the extreme of the land near Zephine head leads nearly on the rock.

Thorp island lies close to the southern shore of the inlet 2½ cables S. by E. ½ E. from Josephine islands, a rock awash lies about half a cable south-eastward from it.

Neville islet is very small and lies close to the northern shore nearly half a mile E.S.E. from Cross islet.

Cochrane islands, a group of several small islets extending 3½ cables in a north-west and south-east direction, lie 2 cables from the south shore of the inlet, and southward from Neville islet. These islands should not be approached too closely, and there is a patch with 3 fathoms water on it about one cable from their western end.

Lion rock, surrounded by kelp, lies 2 cables S.E. from Selina point, the south extreme of Gifford peninsula, and 2 cables eastward of Coode peninsula.

Trevenon bay, one of the arms of Malaspina inlet and 2½ miles from its entrance, indents the land and runs parallel to the strait of Georgia in a S.E. by E. ½ E. direction for 1¼ miles, and at its head is only separated by a narrow neck of land 3 cables broad from Penrose bay, which branches off at the junction of Malaspina inlet with Oke over arm, and runs in a N.W. by W. direction for half a mile, forming Coode peninsula to the eastward. Off the south-east extremity of Coode peninsula, distant one cable, is Boundary rock The entrance to Trevenon bay is half a mile south-east from Scott point; the average width of the bay is less than a quarter of a mile, the depth of water varying from 25 fathoms to 4 fathoms at 2 cables from the head. Off the north-west entrance point of the bay lies the small island of Alton, not a cable distant from the shore.

Lancelot arm branches off at Selina point sharply to the N. by W. and extends in that direction for 3 miles; its head is only divided from Portage cove (Desolation sound) by a low neck of land not much more than half a cable across, forming Gifford peninsula, triangular in shape, rising abruptly over Portage cove to a height of 1,000 feet, and having part of the northern shore of Malaspina inlet for its base, where it is not more than half the height. The arm maintains an average width of 6 cables until near its head, where it is only 2½ cables wide. In the southern part of Lancelot arm the water is very deep, but at about three-quarters of a mile from Selina point until half a mile from the head the depths vary from 30 to 37 fathoms, and then shoal to 17 fathoms and gradually to 11 fathoms.

Isabel bay, about 1⅓ miles from Selina point, on the west shore of Lancelot arm, is about 2 cables in extent and affords anchorage for coasters in from 10 to 12 fathoms water. Mary and Polly islands lie in the entrance.

Thors cove, on the eastern shore of Lancelot arm, 1½ miles north of Hillingdon point, the east entrance point of the arm, extends in an E.N.E. direction for 3 cables with from 12 to 5 fathoms water. A coaster might drop an anchor in this cove in about 10 fathoms. At one cable's length off Sebastian point, the north entrance point of Thors cove, is Thynne island.

Theodosia arm has its entrance at about one mile from the head of Lancelot arm, and extends in a N.E. direction for 1½ miles with a moderate depth of water and a width of 3 cables, but the entrance to it is so very narrow and choked with rocks, as to render it for all practical purposes useless.

Anchorage.—Vessels of moderate size may anchor in Wootton bay, about one cable from the head of Lancelot arm in 12 fathoms water.

Grace harbour, on the northern side of Malaspina inlet, about 2½ miles from Zephine head, has its entrance between Scott and Moss points, which are about one cable apart in an E.N.E. direction. The harbour extends about one mile N. by E. ½ E., and is divided at the head by a jutting point into Barlands and Carberry bays. Two cables within the entrance points a small island lies nearly in the middle of the channel; there is a passage on both sides of it, but the western one is only suitable for boats. At 4 cables above the island the harbour for a short distance contracts to half a cable, and then opens out to the width of 2½ cables.

Directions.—Having entered Malaspina inlet midway between Georgina point and Zephine head, keep over towards Holland point until the channel on the southern side of Josephine islands opens out, and then steer boldly through it with Cochrane islands nearly ahead (the course will be S.E. by E. ½ E.). Keep the extreme of the land near Zephine head about

midway between the south side of Josephine islands and the south shore, if anything rather nearer the latter, which will lead between Rosetta rock and the rock off Thorp island; when Neville islet bears E. ¾ N. steer towards it for a short distance, to avoid the 3-fathom patch off Cochrane islands, until the north-west Cochrane island bear S.S.E., when alter course to round Scott point at the distance of one cable and steer up the harbour mid-channel, passing to the eastward of the small island lying 2 cables within the entrance. A shoal patch on which, however, the least water is 4 fathoms, lies 2 cables south-east from Scott point.

Anchorage.—The best anchorage is in about 10 fathoms water, 1½ cables to the northward of the small island, abreast Ka kae kae village.

Tides.—The tides at the entrance of Malaspina inlet run about 2 knots It is high water at full and change at 5h. 0m.; springs rise 12 feet, and neaps 9 feet.

KINGHORN ISLAND, in the south entrance to Desolation sound, is about 2 miles in circumference, and from 400 to 500 feet high; it is cliffy and steep-to on the south-west side.

Station island, about 1¼ cables in extent and 270 feet high, lies 2¼ cables N.N.E. from the north point of Kinghorn island; two small islets lie between.

Mink island, lying on the south side of Desolation sound, and nearly midway between Redonda island and the main, is three-quarters of a mile long, one-third of a mile wide, and 700 feet high; its shores are clear of danger. A short distance from its north-east end are Broken islands.

The west side of Redonda island, north-west of Kinghorn, forms the [illegible] shore of Lewis channel, and is sterile, rocky, and steep-to, rising in its northern part to craggy mountains upwards of 3,000 feet high. At a distance of 6 miles from the south entrance to Lewis channel the Teakerne arm penetrates Redonda island 4 miles in an E.N.E. direction, but is too deep to afford anchorage, except for small craft near its head, and close to the south side of entrance.

DESOLATION SOUND, between the south-east shore of the western Redonda island and Mink island, has too great a depth for anchorage.

At the distance of half a mile north-east from Mink island is Otter island, only separated from the main by a very narrow passage.

Deep bay.—Bold head, the western entrance point of Deep bay, lies one mile East from the south point of Otter island; three small islets lie S.W. by S. from it, the outer one, Grey islet, being distant 4 cables. The entrance to Deep bay is about 3 cables wide, which width it maintains to its head, a distance of nearly one mile, with a general northerly direction.

The anchorage space is confined, and but small vessels can anchor in a cove at its north-west corner in 10 fathoms. When entering from the northward pass between Otter and Broken islands and westward of Grey islet; from the westward the channel is clear. The entrance of the bay is 4½ miles N.E. ¾ N. from Zephine head, the north-west extreme of Gifford peninsula.

To the northward of Otter island there is group of small islands lying in pairs, Morgan and Melville islands being to the southward, and Mary and Eveleigh islands to the northward. Melville and Mary are the westernmost, the former, which is 450 feet high, being the largest of the group, and the latter the smallest. At half a [illegible] by N. from the south end of Morgan island there is a rock which is [illegible] wash at high water.

Prideaux haven,* situated 3 miles north-eastward from Mink island in the N.E. part of Desolation sound, affords good and sheltered anchorage. The entrance between the east shore of Eveleigh island and the Oriel rocks is only 85 yards wide, but not less than 5¼ fathoms was obtained by H.M.S. *Scout* when entering in 1872. The anchorage is in the western part of the haven in 7 to 9 fathoms. Melanie cove, the eastern part of the haven, is entered by a narrow channel about half a cable wide, opening out inside to one cable in width with 4 to 6 fathoms water.

HOMFRAY and WADDINGTON channels.—Northeastward from Desolation sound is Homfray channel, 15 miles in length, leading to Toba inlet, and westward through Pryce channel to Bute inlet. Homfray channel appears clear of dangers, with deep water throughout. Waddington channel leading from Desolation sound north-westward between the two Redonda islands, is about one mile wide at its southern entrance, gradually narrowing to about one cable at its northern.

At three-quarters of a mile south of Marylebone point (the south-west entrance point of Waddington channel) there is a remarkable white patch.

Pendril sound.—At 3 miles north-west from Horace point, the south-eastern entrance point of Waddington channel, Pendril sound branches off to the northward; it extends 6 miles with an average width of three-quarters of a mile, and nearly divides the east Redonda island into two parts; it has no anchorage.

Walsh cove,† between the Gorges islands and the western shore of Waddington channel, affords anchorage in 12 to 14 fathoms water in mid-channel.

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* *See* plan of Prideaux haven on Admiralty Chart, No. 580; scale, $m = 2{\cdot}0$ inches. It is high water, full and change, in Prideaux haven, at 5h. 0m.; springs rise 12 feet.

† *See* plan of Walsh cove on Admiralty Chart, No. 580; scale, $m = 2{\cdot}0$ inches.

TOBA INLET extends in a general north-easterly direction for 18 miles from the northern end of Homfray channel. At its entrance, lie Channel and Double islands, each 400 feet high, leaving a channel of over one mile in width between them; the inlet is here nearly 2 miles wide, gradually narrowing to one mile wide at its head. A fair berth is in about 20 fathoms in the north-west corner of the head of the inlet off the flats. Care must be observed when coming to an anchor as the water shoals rapidly alongside the flats, the water being of a milky colour affords no guide as to its depth. There is a small village (Clahoose Indians) on the banks of the eastern of the two streams which flow into the head of the inlet.

SUTIL CHANNEL.—This extensive channel, which leads from the western part of strait of Georgia to the entrances of Toba and Bute inlets, is bounded on the east side by Cortes, and on the west by Valdes and Read islands. It is 15 miles long in a northerly direction, and at its entrance to the strait of Georgia is 6 miles wide, decreasing to one mile in the northern part. The soundings in mid-channel are deep, though there are several dangers off both shores near the southern parts, but northward of Mary island it is quite clear.

There are several good anchorages on both shores, two of which, Drew harbour (on the west) and Carrington bay on the east shore of the channel, are easy of access to all vessels, and useful as stopping places.

The tides in the Sutil channel are weak, seldom exceeding 2 knots; the flood stream sets to the northward from the strait of Georgia; it is high water, full and change, at 6 hours, and the rise and fall is 12 feet.

CORTES ISLAND.—The west side of this island, which forms the eastern boundary of Sutil channel, is for the most part low, and indented by several bays and creeks, in many of which good anchorage may be found.

Reef point, its south extreme, has a ledge composed of sand and boulders extending three-quarters of a mile from it which covers at three-quarters flood; off its outer edge are 6 fathoms. The north side of Texada island well open south of Savary and Hernando islands bearing E. $\frac{1}{8}$ S., will lead a quarter of a mile south of the ledge, and also south of the Boulder reef (page 191).*

From Reef point the west coast of Cortes island trends in a northerly direction for $3\frac{1}{2}$ miles, is flat, from 80 to 150 feet high, and bordered by a sandy beach extending upwards of 2 cables' lengths off in some parts; it afterwards turns in a westerly direction, becoming rocky and broken, with a few islets a short distance off it in some places.

* *See* view B. on Admiralty chart, No. 580.

GORGE HARBOUR,* the entrance to which is on the west side of Cortes island, 4½ miles N.N.W. from Reef point, is 2 miles long in a westerly direction, and one mile broad at the widest part, affording good anchorage in 9 to 12 fathoms. The entrance to it is through a narrow gorge nearly half a mile long, bounded on both sides by steep cliffs about 200 feet high, and is less than 40 yards wide in some places, with 6 fathoms in the shoalest part; the tide sets through it at from 3 to 4 knots. At the inner end of the Gorge is Tide islet, 20 feet high, lying nearly in the middle of the channel; the passage is to the westward of it. There are several small islands inside the harbour, and the shores are rocky, varying in height from 100 to 300 feet.

Guide islets, just south of the entrance, are useful in indicating it, being two small, bare, yellow-topped islets about 20 feet high, and conspicuous from the south-east. They are steep-to, and there is a clear passage on either side of them into Gorge harbour.

Bee islets, within the harbour, 3 cables north-west from the entrance, are two small bare rocks about one cable apart, and 6 feet above high water. They may be approached close to, and the best anchorage is from one to 2 cables' lengths west from them.

Brown island, in the middle of the harbour, about 3 cables N. by E. from the entrance, is nearly one mile in circumference, and thickly timbered. It is about 150 feet high, the shores are rocky, and may be approached to within one cable's distance.

Ring island, at about one cable's length east from Brown, and 70 feet high, is wooded, but much smaller; the New rock, which covers at one-quarter flood, lies nearly one cable east from it, and should be avoided. There are two small islets, Stove and Pill, each 30 feet high and 3 cables' lengths apart, lying close to the shore in the northern part of the harbour. Neck islet, 20 feet high, lies off a small cove in the south-east corner of the harbour. New rock is situated midway between the north ends of Neck islet and Ring island.

Anchorage.—The best and most convenient anchorage in Gorge harbour is in the west part, about half a mile from the entrance, in 12 fathoms water.

There is also good anchorage between Ring island and the north-east part of harbour in from 7 to 9 fathoms.

Directions.—Entering Gorge harbour, which can only be done with a favourable tide, unless in a steamer, after passing Guide islets, steer boldly up the gorge or entrance, and take care, on nearing its north part,

* *See* plan of Gorge harbour on Admiralty chart, No. 580, scale, *m* = 3 inches.

to pass between Tide islet and the west shore, the passage east of the islet being shoal, when haul to the north-west, pass on either side of the Bee islets, and anchor in from 10 to 12 fathoms, muddy bottom, one or 2 cables' lengths to the westward from them. Proceeding to the eastern part, after passing Tide islet, keep to the northward, and rounding the west side of Brown island at one cable's distance, haul to the eastward, and passing along the north shore of it and Ring island at half a cable distance, anchor midway between the latter and the north-east end of the harbour in from 7 to 10 fathoms. If requiring to water, this anchorage is more convenient; but to avoid the New rock vessels should not go to the southward of Ring or Brown islands.

MARY ISLAND, on the east side of Sutil channel about 3 miles N.W. by W. ½ W. from Reef point, is of a round shape, about 6 miles in circumference, and from 90 to 120 feet high; its shores are bordered by a sandy beach, strewed with huge boulders.

Boulder reef, extending upwards of one mile in a south-south-east direction from its south point, is a ledge about 2 cables wide, which covers at high water.

When passing west of Mary island, keep the north side of Texada island open south of Savary and Hernando islands bearing E. ⅞ S. until Camp island opens west of Mary island N.N.W., which will clear the Boulder reef on the south and west sides.*

Shark spit.—From the north part of Mary island a sand-spit extends in a northerly direction to within one cable's length of Cortes island. There are 8 fathoms in the passage between the spit end and Cortes island.

Camp island, off the west extreme of Cortes island and 7 miles from Reef point, is of small extent, 100 to 200 feet high, and wooded.

Plunger pass, between Camp and Cortes islands, is about 3 cables wide, deep, and clear of danger.

Centre islet, two cables' lengths west from Camp island, is bare, and about 12 feet above high water; at this spot Sutil channel turns from N.N.W. to North, and becomes narrower.

CARRINGTON BAY, on the north-west side of Cortes, about 3 miles from Centre islet, is one mile deep in an easterly direction, about 3 cables' lengths wide, and affords anchorage at a distance of 3 cables' lengths from its head in from 7 to 11 fathoms water. Along its north side are some small islets, and a rock which uncovers at low water, but if intending to anchor in the bay, keep at about one cable's distance from the

* *See* views A. and B. on Admiralty chart, No. 580.

south shore, which will clear all danger. At the head of the bay is a large salt-water lagoon.

VON DONOP CREEK, the entrance of which is 5½ miles from Centre islet, is long and narrow, penetrating Cortes island in a south-easterly direction for upwards of 3 miles. There is good anchorage in 5 to 6 fathoms near its head, but the entrance being only 30 yards wide in some places, with 3½ fathoms in one spot, a vessel should not use it as a stopping place, as Carrington bay is much more convenient and easy of access.

One mile north from Von Donop creek the coast of Cortes, which is rocky and steep-to, rising abruptly to 1,141 feet, turns north-west for 3 miles to Bullock bluff, at the termination of the Sutil channel and at its junction with Calm and Lewis channels and Deer passage.

VALDES ISLAND.—From cape Mudge, the south extreme of Valdes island and the south-west entrance point of Sutil channel (*see* page 164), a bank extends in a south-easterly direction for nearly 2 miles, and until well inside the channel the cape should not be approached within that distance. The coast of Valdes turns sharply round the cape to the N.N.W., trending in a straight direction for 5½ miles, and bordered the whole distance by a beach extending off upwards of one cable's length in many parts. The land is flat, and heavily timbered, but appears very fertile.

DREW HARBOUR,* on the east side of Valdes island, 6 miles from cape Mudge, is about one mile deep, 3 to 4 cables wide, and rendered perfectly secure and land-locked by Rebecca spit, a narrow strip of land 6 to 8 feet high and open wooded, which forms its eastern boundary; its shores are low, and bordered by a sandy beach.

Anchorage.—The anchorage, in 9 to 15 fathoms, sandy bottom, at a distance of half a mile from its head, is the best in Sutil channel.

Heriot islet, lying to the north-west of the entrance, is about 250 feet high, rocky, of small extent, and separated from Valdes by a narrow boat pass. In the bay to the southward of it is fair anchorage, and fresh water may be procured; the depths, however, in the entrance to it are irregular.

Directions.— If intending to anchor in Drew harbour a vessel may round the north part of Rebecca spit at a distance of about one cable, proceed up the harbour in mid-channel, and anchor at about half a mile from its head in 15 to 9 fathoms. The east side of Rebecca spit should not be approached within 2 cables.

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* *See* plan of Drew harbour on Admiralty chart, No. 580; scale, =3 inches.

HYACINTHE BAY, on Valdes island, 1½ miles north-west of Drew harbour, is of small extent, with from 16 to 20 fathoms water, but affords no anchorage; a small rock 4 feet above high water lies in the middle of the entrance.

Open bay, half a mile north from Hyacinthe bay, and separated from it by a rocky point, is half a mile in extent, with from 10 to 12 fathoms water, but as the bottom is rocky, and the bay open to the south-east, a vessel should not anchor there.

Breton islets, 40 feet high and extending upwards of one mile in a south-easterly direction from the north part of Open bay, are small, and from the outer one, which is wooded, a reef extends 3 cables' lengths, covering at one-quarter flood. The passage between these islets and Rebecca spit is deep and clear of danger.

HOSKYN INLET, formed between Read and Valdes islands, on the east side of the latter, is 7 miles long in a northerly direction, with an average breadth of two-thirds of a mile; the shores are broken and rocky, with some small islands off the south entrance and along the east side, and there is no anchorage within it, except for small craft. This inlet contracts at its northern end to a very narrow passage leading into Drew pass, but as it is choked with rocks and dries at low water, connecting Read and Valdes islands, the only exit is by the southern entrance.

Village bay, on the west side of this inlet, just within the entrance, is about one mile deep and one-third of a mile wide, with from 12 to 24 fathoms water, but affords no good anchorage; there is a large village at its head.

READ ISLAND, bordering the west side of the north-west part of Sutil channel, is 9 miles long in a northerly direction, and from one to 3 miles broad; its southern part is low, but rises gradually to the northward to 1,608 feet; the shores are rocky, steep-to, and much indented, especially on the east side near the middle. Viner point, its south extreme, 7 miles north from cape Mudge is bare, and about 40 feet above high water.

Burdwood bay, on the east side of Read island, 2 miles from Viner point, is about one mile wide, 2 to 3 cables deep, and contains several small islets. There are 12 fathoms water at a short distance off shore, in its north and south parts, where a vessel may stop in fine weather, but the bay is open to the south and east.

Evans bay, the next inlet on the east side of Read island, to the northward of Burdwood bay, is about 3 miles long in a northerly direction, 1½ miles wide at the entrance, and branches off in two narrow arms near its head; its shores are rocky and much broken, and there is no anchorage

except in Bird cove, on the west shore, where small craft may find shelter. Frederic point, the north-east point of entrance to the bay, is bold, and may be approached to within one cable.

Hill island, just outside the entrance to Evans bay, is of small extent, but conspicuous; its summit being 490 feet high. The shores are rocky, and may be approached to within one-quarter of a mile.

PENN ISLANDS, four in number, near the middle of the Sutil channel, to the northward of Evans bay, cover an extent about 1½ miles long and one mile wide; they are rocky, covered with stunted trees, and their greatest elevation is about 270 feet. A vessel should not venture among them, but there is a clear passage on their east and west sides.

A rock awash lies 80 yards N. 55° E. from the north point of the eastern island.

The east side of Read island to the northward of the Penn islands is rocky, but may be approached anywhere to within one-quarter of a mile.

Directions.—Entering the Sutil channel from the strait of Georgia, pass within half a mile on either side of Mitlenatch island, and steer N.W. by W. or N.W. ½ W. for the entrance, taking care to keep the north side of Texada island open south of Hernando and Savary islands bearing E. ⅞ S., until Camp island opens west of Mary island bearing N.N.W., to clear the reefs extending off the south points of Cortes and Mary islands (pp. 189, 191); when clear of the latter danger haul more to the northward, steering about N.N.W. or N.W. by N., and passing about one-quarter of a mile westward of Centre islet, steer up mid-channel, eastward of the Penn islands.

If entering this channel in thick weather, and the above marks be not seen, when past Mitlenatch island keep it on a S.E. by E. bearing, and steer N.W. by W. till the south part of Mary island bears N.E. by N.; a vessel will then be clear of the Boulder reef.

A vessel may beat through this channel, but till past the dangers in the south part it would not be prudent to near the west sides of Cortes and Mary islands within 1½ miles when standing to the eastward; and when standing towards cape Mudge do not approach it within 2 miles, or bring Mitlenatch to the eastward of E. by S. ½ S., until the cape bears S.W., when a vessel may stand to within half a mile of the Valdes shore. If intending to anchor, Drew harbour and Carrington bay are easy of access for any class of vessel, and are but little out of the regular track.

CALM CHANNEL, to the north of Lewis and Sutil channels, leading from them to Bute inlet, is 9 miles long in a N.W. by W. direction, and about one mile broad; its shores rise abruptly to a great height, are everywhere clear of danger, and the tides weak, except in the north-west part.

Rendezvous islands,* three in number, which lie on its west side near the south part, cover an extent 3 miles long in a W.N.W. direction, and about half a mile wide; the eastern island is 350 feet, the middle 300 feet, and the western 601 feet high.

Drew pass is a deep passage between the Rendezvous islands and the north part of Read island; and between the middle and easternmost islands is a small spot with from 7 to 15 fathoms water, where a small craft may anchor.

Calm channel is not well adapted for any vessels except steamers, as there is generally but little wind, and no anchorage.

Raza island, lying at the northern entrance to Sutil channel, is of a rectangular shape, 3 miles long north and south, and 2 miles wide east and west, and 3,020 feet high; a portion of its south side, which forms the northern side of Calm channel, is cliffy.

North passage.—On the west side of Raza island is North passage, communicating with Ramsay arm which indents the continent in a northerly direction for 7 miles and has deep water throughout.

Deer passage, between Raza and Redonda islands, 4 miles long and 1½ miles wide, connects Pryce channel with Sutil channel. Both North and Deer passages are clear of danger.

Stuart island, at the northern termination of Calm channel, and in the entrance of Bute inlet, is about 4 miles in extent, of an undulating surface, rising in some parts to 800 and 1,000 feet. Its shores are rocky and clear of danger; the tides set strongly round its north and west sides, but there is a clear passage into Bute inlet to the eastward of it, nearly one mile wide, in which very little tidal stream is felt.

BUTE INLET.—This extensive arm of the sea, which penetrates the continent for nearly 40 miles in a winding course to the northward, presents many similar features to Jervis inlet (page 175), the general breadth varying from one to two miles, and the shores on both sides rising abruptly and almost precipitously in many places to stupendous mountains from 5,000 to 8,000 feet high, whose summits are generally covered with snow all the year round. At the head are two extensive valleys, one penetrating to the north-west and the other to the south-east, from which flow streams; the one to the westward, called by the natives Homalko river, is navigable for a long distance by boats and stern-wheel steamers of light draught. Off these rivers some sand-banks extend a short distance, affording indifferent anchorages near their outer edges; but the soundings everywhere else in the inlet are very deep. The water

* It is high water, full and change, at the Rendezvous islands at 7h. 0m.; springs rise 14 feet.

for some distance from the head is nearly fresh, and of a milky white appearance; in the summer months there is a constant outset, varying in strength from one to 2 knots.

Arran rapids, at the entrance to Bute inlet on the west side, between Stuart island and the continent, are one cable wide in the narrowest part. The tides rush through with great strength (the flood from the westward), and it is very hazardous for a vessel to go through.

Orford bay, on the east side of the inlet, 19 miles from the entrance, is of small extent, with 35 fathoms water close to the edge of the bank, which extends from the head. A small vessel may use it as a stopping place.

WADDINGTON HARBOUR, at the head of the inlet, being in fact its termination, is about 2 miles in extent, and affords very indifferent anchorage off the edge of the banks,* extending from the Homalko and Southgate rivers and off its east shore. Except in the vicinity of the rivers the land rises almost precipitously to 4,000 and 5,000 feet, is most sterile and rocky, covered with stunted pines. The best anchorage is near the north part, about half a mile off shore, in 15 fathoms, but it is exposed to the south-west, and strong winds from this quarter would make the anchorage unpleasant, if not unsafe.†

Homalko river enters Waddington harbour on the west side, and is a stream of considerable extent, winding to the north-west through a large valley. At the entrance is a bar with only one to 2 feet water over it at low tide, but within, the water deepens to one and 3 fathoms; the breadth varies from 50 to 200 yards, and the river is navigable for boats and small steamers several miles. The shores for 2 miles from the entrance are low and swampy, covered with willows, but farther up on the western side the land rises 4 or 5 feet above high water, and appears very fertile, though heavily timbered; the opposite side is steep and rocky; in summer months the current runs upwards of 5 knots out of the river.

From the sources of the Homalko river there is an easy route to the gold-mining regions in the far north of British Columbia.

Directions.—In navigating Bute inlet but few directions are required, as the points may be everywhere approached to within a distance of half a cable, and, if intending to anchor in Waddington harbour, when nearing it, steer for its north part, anchoring at about three-quarters of a mile off the head in 15 fathoms, and about 3 cables' lengths from the high

* These banks are constantly changing.—Navigating Lieutenant E. Clapp, H.M.S. *Scout*, 1872.

† *See* plan of Waddington harbour on Admiralty chart, No. 580; scale, *m* = 2 inches. It is high water, full and change, in Waddington harbour at 6h. 0m.; springs rise 13 feet.

northern shore; the anchor should be dropped immediately 15 fathoms are obtained, as the bottom shoals rapidly.

Sailing vessels entering or leaving the inlet should keep close to the eastern shore, or the ebb tide may take them through the Arran rapids to the westward.

Tides.—It is high water, full and change, in Calm channel at 7h. 0m., springs rise 14 feet. In Bute inlet it is high water at 6h. 0m., and the rise and fall varies from 12 to 14 feet.

CARDERO CHANNEL, communicating by Nodales channel with Discovery passage and Johnstone strait, winds in a general east and west direction for 19 miles, with an average width of one mile at the eastern part, but only half a mile in the western. It is bounded on the north by the mainland, and on the south by Valdes and Thurlow islands; its shores, which are much indented, are generally rocky and mountainous, and the channel is studded with numerous small islands, and it is not without dangers, the the water in most parts, however, being very deep.

Stuart island lies across the eastern entrance of Cardero channel, almost blocking it, but leaving narrow passages both to the northward and southward; the former, Arran rapids, owing to its narrowness and the strength of the tide, which rushes through it at the rate of from 7 to 9 knots, is not navigable except at great risk; the latter, half a mile wide, is also not recommended, as at its northern end the tide runs directly at right angles to a vessel's course at the rate of from 6 to 7 knots. At 2½ miles within the entrance Dent island causes further obstruction by contracting the channel to 3 cables, which narrow passage is full of dangerous rapids, overfalls, and whirlpools, with the probability of the existence of sunken rocks; therefore it cannot be considered safe or prudent for vessels to enter or leave Cardero channel by its eastern entrance, and they are advised to carefully avoid that part of it which is to the eastward of Dent island.

From Stuart island Cardero channel runs 7 miles W. by N. where Frederick arm branches off to the northward and Nodales channel to the southward. After running a further distance of 3 miles in the same direction, it turns (at its junction with Philipps arm) to the S.W. by S. for 5½ miles, and then W.S.W. for 4 miles, where it joins Loughborough inlet and Chancellor channel, the former branching off to the northward and the latter continuing a westerly course for 8 miles, where it unites with Johnstone strait.

Anchorages.—Cardero channel has but few places that afford anchorage. Bickley bay on the north side of Thurlow island, and nearly opposite to Philipps arm, is about 3 cables in extent with from 16 to

21 fathoms water, and near its head 6 fathoms. Mayne passage 3½ miles eastward of Loughborough inlet, and also on the north side of Thurlow island, affords shelter in from 9 to 15 fathoms water. This passage branches off to the southward and westward, probably communicating with Johnstone strait, but it has only been partially examined. Vessels may also bring up in 15 fathoms in Crawford anchorage inside the Erasmus islands on the north shore of Thurlow island, 1½ miles N.E. by E. from Mayne passage.

Tides.—The tides in Cardero channel run at the rate of from one to 2 knots in the western part, increasing to 3 and 4 knots to the eastward of Nodales channel; between Dent island and the eastern entrance to the inlet they run with great rapidity, especially in the narrow passage between Dent and Valdes islands which, as before observed, is full of whirlpools and overfalls.

Caution.—When bound from Bute inlet to the north-westward, vessels should proceed to the eastward of Valdes and Read islands by the Calm and Sutil channels, round cape Mudge, and through Discovery passage, and not attempt to shorten the distance by using Cardero channel.

Frederick arm branches off to the northward from Cardero channel, opposite Hall point (the north point of Valdes island), and extends about 3 miles in that direction, shoaling gradually at its head towards a stream which here enters the inlet flowing from a sheet of water extending some distance to the northward, and known as the Estero basin. The flats usually found extending a considerable distance from the shore at the head of most of the numerous inlets or fiords, and which are invariably steep-to, only extend a very short distance off the shore at the head of Frederick arm, and are not so steep-to, and it, therefore, appears to afford a better anchorage than any of the other inlets on the mainland, being only exposed to the southward. Anchorage may be had at a reasonable distance from the shore.*

Philipps arm, lying immediately westward of Frederick arm, extends about 5 miles in a N.N.E. direction, shoaling gradually off the flats at its head.

LOUGHBOROUGH INLET penetrates the continent for 17 miles in a northerly direction; it has much the same characteristics as most of the arms that indent the north-west coast of North America, being almost hemmed in by precipitous mountains rising abruptly from the shore, and having great depth of water with but little anchorage. At the entrance between Styles and Grismond points, at its junction with Cardero and

* H.M. gun-vessel *Rocket* anchored here in 1879, and the above remarks are by Lieutenant Nedham, R.N., of that vessel.

Chancellor channels, the inlet is about 8 cables wide, which is the average width to within about one mile from the head, when it opens out to 1¾ miles. From the entrance the inlet extends north for 6 miles as far as Cosby point, which projects from the west side, its direction for 7 miles is then N. by W. ½ W., turning at Towry head into Cooper reach, which takes a gentle curve between N.E. and North for 4 miles to the head, terminating in Fraser and McBride bays, which are separated by Pan point jutting out in the centre. The latter bay affords anchorage in about 25 fathoms at 3 cables from the shore; in the former the water is very deep until close in.

Sidney bay, 2½ miles South from Cosby point on the west shore, and 6¼ miles north from Styles point, extends about three-quarters of a mile to the westward and is about one cable wide, affording anchorage for coasters near its head in 16 fathoms water.

Beaver creek,* on the west shore of Loughborough inlet, 4 miles within the entrance, extends 2 miles in a south-westerly direction, varying from one to 3 cables wide, and shoaling gradually towards its head, where good and sheltered anchorage may be obtained in 7 fathoms; anchorage may also be obtained in about 15 fathoms in mid-channel westward of Goat islands. Vessels must not pass northward of Goat islands (lying half a mile within the entrance), as they are connected to the north shore by a flat which dries at low water. Good water may be obtained from a stream at the head of the creek, and firewood (Cedar) may be cut for steaming purposes.

Tides.—The tides in Loughborough inlet are not strong, seldom exceeding a rate of from one to 2 knots an hour. It is high water, full and change, in Beaver creek at 3h. 0m.; springs rise 16 feet.

* *See* plan of Beaver creek on Admiralty chart, No. 580; scale, $m = 3{\cdot}0$ inches.

CHAPTER VI.

FROM THE STRAIT OF GEORGIA WESTWARD TO CAPE SCOTT AND THE SCOTT ISLANDS.

VARIATION 24° 20′ E. in 1888.

DISCOVERY PASSAGE,* formed between the west side of Valdes island and the Vancouver shore, is the only safe navigable outlet from the north part of the strait of Georgia to the N.W. Its length in a N.W. and S.E. direction from cape Mudge to Chatham point is 23½ miles, and its average breadth a little more than one mile; but at Seymour narrows it contracts to less than half a mile. Its shores, southward of the narrows, are moderately high and apparently fertile, but northward of them steep, rugged, and mountainous.

Tides.—Southward of Seymour narrows the streams run with great strength, from 4 to 6 knots at springs, and turn at high and low water by the shore. At the southern entrance, near cape Mudge and between it and Willow point, heavy races or tide rips rage during the flood, which would be dangerous to small vessels in blowing weather. It is high water, full and change, at 5h. 30m., and the rise and fall is about 11 feet.

Northward of Seymour narrows the tidal streams are comparatively slack; they run from 1½ to 2½ hours after high and low water. At the narrows it is high water, full and change, at 3 hours, and the rise and fall is about 13 feet.

Soundings.—In Discovery passage, when to the southward of Seymour narrows, the depths in mid-channel vary from 30 to 60 fathoms, except at one mile N.W. by W. from cape Mudge, where a shoal patch of 8 fathoms exists. In Seymour narrows the least water in mid-channel is 2¼ fathoms on Ripple rock; but northward of them the depth increases to 100 and 140 fathoms.

QUATHIASKI COVE.†—Cape Mudge, with the bank off it to the south-east, have been already described (*see* page 164). From it the west side of Valdes island takes a north-westerly direction, and at the distance

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* *See* Admiralty chart:—Strait of Georgia, sheet 2, No. 580; scale, *m* = 0·4 of an inch.

† *See* plan of Quathiaski cove on Admiralty chart, No. 2,067; scale, *m* = 3 inches.

of 3 miles is a small indentation named Quathiaski cove, bordered by a sandy beach. The cove, which is about 6 cables long in a N.W. and S.E. direction, and nowhere half a mile wide, is only fit for steamers or small craft, and only affords room for one vessel to moor in its south-east, and another in its northern part; the former is recommended, about one or 2 cables' lengths south-east from Grouse island, in 10 fathoms, well sheltered from all winds. The tide sets slightly through the cove, but sweeps strongly past the entrance.

The land between cape Mudge and Quathiaski cove is about 100 feet high, flat, and fertile; an Indian village of considerable extent stands midway between the two places.

Grouse island, in the centre of the cove, is small and moderately high; a shoal extends for two-thirds of a cable off its south-east point, which ought to be guarded against when entering. If intending to anchor in Quathiaski cove, a vessel should enter south of Grouse island (paying careful attention to the tides), and keep well over towards the south shore until inside. In the middle of the channel north of Grouse island is a shoal with only a depth of 3 feet on it.

Anchorage.—Moor midway between the south-east point of Grouse island and the opposite shore, in from 7 to 10 fathoms. If necessary a vessel may proceed to the north part of the cove inside Grouse island, and anchor in from 7 to 9 fathoms. Careful attention to the helm is important.

GOWLLAND HARBOUR,* about 5 miles north-west from cape Mudge, is of considerable extent, being upwards of 2½ miles long in a N.W. and S.E. direction, and one-quarter to two-thirds of a mile broad. The shores are rugged, and there are several rocks and islands within it.

Steep island, off the entrance, is about 100 feet high, 4 cables long N.W. and S.E., and one cable wide; the western side is cliffy.

Gowlland island, which protects the harbour to the south-east, is about one mile long and one-quarter of a mile wide, high and rugged, with a summit at both ends, the southern one being nearly 400 feet high.

Entrance bank lies nearly across the entrance to the harbour, and partly dries at low water; it is composed of sand, being 4 cables in length N.W. and S.E., and one cable broad; there is a clear passage on both sides of it, with not less than 4 fathoms water; its south end, in 3 fathoms, is one cable north from Vigilant point, the north-west extreme of Gowlland island.

Directions.—If entering Gowlland harbour from the southward round Steep island at a distance of about one cable, and steer E.N.E.

* *See* plan of Gowlland harbour, on Admiralty chart, No. 2,067; scale, *m*=3 inches.

for Vigilant point, which is steep-to, and ought to be rounded at less than half a cable's length to avoid Entrance bank. Having passed the point, anchor in 5 to 7 fathoms, muddy bottom, at about 2 cables' lengths east from it, or proceed farther to the south-east, where more extended anchorage will be found. The passage south of Gowlland is choked up with rocks.

If coming from the north-west, when Vigilant point bears East, steer for it, passing it as before directed.

Anchorage.—The best berth, if stopping for a short time, is in 6 or 7 fathoms at about 2 cables east from Vigilant point; in the south part of the harbour the water is deeper, and the anchorage more extended.

Tides.—It is high water, full and change, in Gowlland harbour at 5.30 p.m.; springs rise 11 feet.

Maud island.—From Gowlland harbour to Seymour narrows the coast takes a W.N.W. direction, being steep-to, high, and rugged. Maud island, the south-east point of the narrows, is small, about 300 feet high, and there is a boat passage between it and Valdes island: a small islet, (Yellow islet) lies 4 cables E.N.E. from it.

Willow point (Vancouver island), the south-west point of Discovery passage, lies nearly 2 miles S. by W. from cape Mudge. It is low, covered with willow bushes, and off it a sandstone ledge extends to the north-east for nearly 3 cables. When passing the point do not approach it within half a mile. From Willow point a low coast trends north-west for 7 miles to Orange point, and is bordered the whole distance by a sandy beach.

Orange point is bare and round, of a reddish colour, not unlike the top of an orange. A boulder spit extends 1½ cables N.W. by N. from Orange point, its outer limit being marked by kelp in 4 fathoms.

Campbell river.—About 1½ miles south-east from Orange point is the entrance of the Campbell river, a large stream of fresh water, navigable for some distance by boats or canoes.

DUNCAN BAY,* of which Orange point is the east extreme, is about half a mile deep, and affords good anchorage in 14 to 7 fathoms, sand, well out of the tide, and sheltered from all except N.W. winds. There is a broad sandy beach at the head of the bay, through which a stream of water flows. This bay is easy of access, and is the best anchorage southward of Seymour narrows.

Anchorage.—A good position to anchor is at from 3 to 5 cables W. ½ S. from Orange point, in from 7 to 14 fathoms.

* *See* plan of Duncan bay on Admiralty chart, No. 538; scale, *m* = 2·0 inches.

Race point, rocky and bare of trees, lying about 3 miles N.W. from Duncan bay, is bold and steep-to. The tide runs past it with great velocity, and, during the flood stream, the overfalls off it are very dangerous for boats.

MENZIES BAY,* of which Wilfred point bluff, rocky and 312 feet high forms the eastern headland, and immediately south-west from Seymour narrows, is of considerable extent, running in a W.N.W. direction for 1½ miles, and three-quarters of a mile broad, but the centre is filled up by a large sand-bank, which partly dries at low water; there is, however, a narrow but clear passage on either side, and good well-sheltered anchorage in 5 to 6 fathoms may be had between this bank and the head of the bay.

The east shore of the bay is high and rugged, the western shore low; both are steep, and from the head an extensive valley runs to the north-west, and a bank extends off 2 cables' lengths.

If intending to anchor in the bay, it is recommended to keep within one cable's length of the east shore for half a mile; when steer to the westward towards the centre of the bay, and anchor in about 6 fathoms, muddy bottom, at half a mile from the head, and 2 cables from the east shore.

With the tide running to the southward an eddy sweeps strong into Menzies bay north from Race point, but at the head of the bay it is still.

SEYMOUR NARROWS,† at 10½ miles N.W. by W. from cape Mudge, is a narrow strait about 1½ miles long, and only from 3 to 5 cables wide, the shores on both sides being high, rugged, and steep-to.

The southern entrance to the narrows lies between Maud islet to the east, and Wilfred point to the west.

Ripple rock.—A dangerous rock, about 1½ cables in extent, in a N.N.W. and S.S.E. direction, with only a depth of 2¼ fathoms on it, lies nearly in the centre of Seymour narrows, but rather on the western side, between Maud island and Wilfred point. Its shoalest part lies 3 cables S.S.W. ½ W. from the north-west point of the island, and nearly 2 cables from the nearest land of Wilfred point; it is near the position of the heaviest tide race.

Tides.—It is high water, full and change, in Seymour narrows at about 3h. 0m.; springs rise 13 feet. The flood stream (from the northward) commences (at F, and C.) about 10 a.m.; the velocity at springs is from 10 to 12 knots, and at neaps 6 to 8 knots. The flood and ebb streams run for nearly equal intervals of six hours. The average duration of slack water is about 10 minutes.

The narrows are, therefore, dangerous for large vessels during the strength of either stream, and it is recommended to only enter at or near

* *See* plan of Menzies bay on Admiralty chart, No. 580; scale, $m = 2{\cdot}0$ inches.

† *See* Admiralty plan of Seymour narrows, No. 538; scale, $m = 2{\cdot}0$ inches.

slack water, and to keep the eastern shore aboard in order to avoid Ripple rock.* The strictest attention to the steerage is essential.

It is stated on good authority that a vessel steaming at the rate of 13 knots has been unable to make headway, and even to be set back, while attempting the narrows during spring tides.

Coming from the southward, Duncan bay is a convenient anchorage for awaiting slack water at Seymour narrows.

Northward of the narrows, Discovery passage takes a north-westerly direction for 12 miles to Chatham point, the shores becoming more high and rugged than before. On the eastern shore are several bays or openings, but, with the exception of Plumper bay, too deep to afford anchorage: the western shore is nearly straight, and near Chatham point are Otter cove and Elk bay, both affording anchorage.

PLUMPER BAY,† on the Valdes island shore half a mile north from Seymour narrows, is about two-thirds of a mile deep, and the same in width, affording anchorage in from 14 to 9 fathoms, near its south-east part, easy of access, well sheltered, and out of the tide. If unable to proceed through the narrows in consequence of the tide, Plumper bay becomes a very convenient stopping place, and no directions are necessary for entering it.

The eddies and tides in Plumper bay if anchored far out are sometimes strong, causing a vessel to surge heavily on her cables.

Deep Water bay, separated from Plumper bay by the peninsula of Separation head, is about one mile deep, and half a mile broad, but too deep for anchorage.

Granite point is a high white granite bluff on the eastern shore of Discovery passage, at 8 miles N.W. by N. from Seymour narrows. On both sides of the point is an opening, the southern one extending east for nearly 3 miles, and containing several islands; the northern one is smaller, but both are too deep to afford anchorage. At 2 cables N.W. from Granite point is a rock with only 9 feet water on it.

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* The U.S.S. *Wachusett*, passing through the narrows from the southward with a strong ebb, settled down in an enormous whirlpool and struck heavily on Ripple rock, carrying away a considerable portion of her false keel, and badly splintering her keel. The U.S.S. *Saranac* was wrecked on this rock in 1875.

† *See* plan of Plumper bay on Admiralty chart, No. 538; scale, $m = 2{\cdot}0$ inches.

The coast on the Vancouver side trends nearly straight from Wilfred point to the north-west for 9 miles to Otter point, the south-east point of Elk bay.

Elk bay, on the west side of Discovery passage, at 9 miles north-west from Seymour narrows, is about 1½ miles broad and three-quarters of a mile deep. It affords indifferent anchorage, in 14 to 15 fathoms, about one-third of a mile from the head, and exposed to northerly winds; Otter point, its southern extreme, slopes gradually to the sea, with a small shingle beach running off.

A rock which covers at half flood lies 1½ cables off the shore, three-quarters of a mile north-west from Elk bay.

OTTER COVE,* on the west side of Discovery passage, 3½ miles from Otter point and just south of Chatham point, is a small but snug anchorage, sheltered from all winds by Limestone island (about 100 feet high), in the centre of the entrance. Snag rock with only 2 feet water on it lies one cable E.N.E from Limestone island.

If intending to anchor in Otter cove, pass north of Limestone (Lewis) island, and anchor midway between it and the head of the cove, in from 10 to 6 fathoms; a large vessel should moor.†

CHATHAM POINT, a low rocky point, nearly 24 miles from cape Mudge, is the north-west extreme of Discovery passage, and also separates it from Johnstone strait. Discovery passage is here 1¼ miles wide.

Chatham point is situated in latitude 50° 20′ 30″ N., longitude 125° 28′ 40″ W.

Beaver rock, awash at low water, lies 2 cables N.E. from the north extreme of Chatham point; in rounding the point, the shore should not be approached nearer than half a mile. Between the point and Nodales channel are several strong eddies or tide rips.

Rocks extend in a scattered way 3 cables north-east from Beaver rock. The point on Valdes island opposite Chatham point has a nearly bare steep rocky face, not much higher than Chatham point.

Directions for DISCOVERY PASSAGE.—Proceeding through Discovery passage from the southward, if the tide be favourable a vessel has only to keep in mid-channel till past Seymour narrows; but if the tide be unfavourable, after passing cape Mudge, keep about 2 or 3 cables off the eastern or Valdes island shore, which is steep-to, and where the tide does not run so strong. If unable to get through the narrows, Menzies and Duncan bays afford good anchorages. The latter is by far the more preferable, being quite easy of access.

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* *See* plan of Otter cove on Admiralty chart, No. 580; scale, *m* = 3 inches.

† The passage south of Limestone island is choked with kelp, the least water obtained was 4 fathoms, but there is probably less.

The time of high water, full and change, in Otter cove is uncertain.

North of Seymour narrows, the tides being weaker (3 to 5 knots), a vessel may proceed either in mid-channel or close to either shore, except in rounding Chatham point, which should not be approached nearer than half a mile. Plumper bay, as before mentioned, affords good anchorage to a vessel waiting for the tide to proceed through Seymour narrows from the northward.

NODALES CHANNEL is 8 miles long in a N.E. by E. direction between Thurlow and Valdes islands, and leading into Cardero channel; its western entrance, which is upward of one mile wide, with deep water, is 1½ miles N.E. by N. from Chatham point; there are some tide rips off it. No soundings at 40 fathoms could be obtained throughout the channel, and in the fairway of the western entrance the depth was 70 fathoms, sand.

Hardinge island, 300 feet high, about three-quarters of a mile long and one-quarter of a mile wide, is 1⅛ miles W. by N. from the entrance to Cameleon harbour, with a passage on both sides. Young passage, to the southward, is one-quarter of a mile wide, and Burgess passage, to the northward, half a mile; there is deep water in both.

Maycock rock.—Three-quarters of a mile W. ¼ S. from the south entrance point of Cameleon harbour, and 6 cables W. by S. from Bruce point, is Maycock rock, with one fathom on it. The shore to the eastward of this rock for half a mile has foul ground marked with kelp extending from it for nearly the distance of one cable's length.

CAMELEON HARBOUR* on the south-east shore of Nodales channel (Valdes island) is about one mile deep in an E.S.E. direction, and has an average width of 3 cables. The entrance, between Bruce point on the north shore and a small islet off the south shore, is less than 2 cables wide, and caution must be observed in rounding Bruce point in order to avoid the Douglas rock lying half a cable off it. It is advisable to keep well outside the kelp when entering.

Anchorage sheltered from all winds, in from 8 to 10 fathoms, may be obtained at 2 cables from the head of Cameleon harbour. The lead should be kept going quickly in approaching the head as the flat which extends nearly 200 yards from it is steep to.

Tides.—It is high water, full and change, in Cameleon harbour at 3h. 0m.; springs rise 16 feet, neaps 11½ feet.

JOHNSTONE STRAIT,† which separates the north-east side of Vancouver island from the mainland, is comprised between Chatham point

* *See* plan of Cameleon harbour on Admiralty chart, No. 580; scale, $m = 3$ inches.

† *See* Admiralty chart of Johnstone and Broughton straits and Queen Charlotte sound, No. 581; scale, $m = 0{\cdot}5$ of an inch.

and Beaver cove, being about 55 miles in length in a W. by N. and E. by S. direction, with a varying breadth of one to 2 miles. The shore on both sides is high and rugged, more especially the southern, which may be said to be a continuous mountain range, rising almost abruptly from the sea, the summits of which vary from 2,000 to 5,000 feet in height, some of the higher ones being snow-clad all the year round.

The shores of the strait are nearly everywhere steep-to, except a few places along the northern side. There are no anchorages whatever along the south shore, but there are several on the northern, viz., Knox, Blinkinsop, and Forward bays, as well as ports Harvey and Neville, all of which, except the latter, being easily accessible to sailing vessels.

The south shore, west of Salmon bay, takes a general westerly direction for 34 miles to Beaver cove, where the high land suddenly terminates, and is indented with a few slight bays, all of which are too deep to afford anchorage. Bauza cove, one mile east of Beaver cove, is a small deep bight, and affords no anchorage; some small islets lie in its entrance.

From Chatham point to the west end of Thurlow island, the soundings in mid-channel are very deep, no bottom in many places being found at 150 fathoms. Near Helmcken island the strait is shoaler and the bottom irregular, the depths in mid-channel varying from 17 to 80 fathoms; but west of Hardwicke island it again deepens to no bottom at 150 and 170 fathoms.

Ripple shoal, on which the least known depth is 7 to 9 fathoms, lies about 1¼ miles West from the west point of Thurlow, and half a mile off the south shore of the strait. This should be avoided.

Tides.—Everywhere in Johnstone strait it is high water, full and change, at 0h. 30m., and the rise and fall of tide is from 15 to 17 feet. The streams run from 2 to 2½ hours after high and low water by the shore, and except in the vicinity of Helmcken island and to the eastward of Knox bay, they are not strong. In the former place they run from 3 to 6 knots, and in the latter 2 to 4 knots; but in other parts of the strait they seldom exceed one to 3 knots per hour. Near Helmcken island are several heavy tide rips, which in blowing weather would be dangerous to boats or small craft; and just west of Chatham point is an overfall producing a considerable swell at times.

THURLOW ISLANDS are on the north side of Johnstone strait, to the westward of Nodales channel; their south side, which borders the strait, is rocky and about 13 miles long in a westerly direction; the eastern half is indented by several bays, off which lie some small islands.

These islands are mountainous, the summits rising to elevations of from 1,400 to more than 2,000 feet; mount Eldon, near the centre of the islands

northward of Pender islands, wooded and square-topped, and quite isolated, is remarkable, and 2,011 feet high.

Knox bay,* on the south side of Thurlow, and 7 miles westward of Chatham point, is two-thirds of a mile deep and about the same in width, affording anchorage in from 15 to 17 fathoms at 2 cables from the head, off the edge of the bank, which is steep-to. The anchorage is well protected from east or westerly winds, but it ought only to be used as a stopping place for the night or tide, as from the steepness of the bank a vessel would touch if a southerly wind sprang up. Off its south-west point foul ground extends for nearly one cable. If intending to anchor, steer for the head of the bay, and anchor immediately 16 fathoms are obtained.

Pender islands, between Knox bay and Nodales channel, are very rugged and barren, the largest being 150 feet high; foul ground exists to the east and west of them for nearly half a mile, and their south side should not be approached nearer than 2 cables. The tide sets strongly between them.

Westward of Knox bay the coast of Thurlow island trends in a W.S.W direction almost straight, for nearly 6 miles, when it turns to the north-west; its shores are high, rugged, and steep-to, and may be approached to within a distance of one cable.

Eden point, the southern entrance point of Chancellor channel and the north-west extreme of Thurlow, is bold and cliffy; half a mile south-east of it is a small bay, too deep to afford anchorage, except for small craft.†

Ripple point, on the south or Vancouver shore of the strait, 6 miles west from Chatham point, is steep-to, and between it and Knox bay are some heavy tide rips in blowing weather. The coast between Ripple and Chatham points is indented by two slight bays, but the water in them is too deep to afford anchorage.

Camp point, 9¾ miles W. by S. ½ S. from Ripple point, slopes gradually to the sea; a rocky beach extends a short distance off it; and half a mile to the north-east of it is the Ripple shoal, with from 7 to 9 fathoms, marked by kelp, about 3 cables in extent, with deep water around it. (*See* page 207.)

Salmon bay.—The coast between Ripple and Camp points runs in a W.S.W. direction, curving slightly inwards; and westward from Camp point to Salmon bay it is nearly straight for 4½ miles. Salmon bay at

* It is high water, full and change, in Knox bay at 0h.; springs rise 16 feet, neaps 12 feet.

† On the line from Eden point, Thurlow island, to Camp point peak, and close to the Vancouver shore, lies a rock covered at high water, which was discovered by Captain Carroll, of the steamer *California*, in May 1880.—United States Pacific Coast Survey, 1883.

high water appears of considerable extent, but affords no anchorage, the bank, which runs off half a mile from its head, being too steep. A river of considerable extent flows into this bay, and is said to be navigable for canoes several miles inland. At this place is the only break in the mountain range on the south shore, and a valley of considerable extent stretches away to the south-east, in the centre of which appears a remarkable bare summit.

HELMCKEN ISLAND, lying 3 miles westward of Thurlow island, in the centre of the strait, is 1½ miles long east and west, and about half a mile wide, with a clear channel of the same width on both sides of it. The island is about 150 or 200 feet high, with a rugged coast line, and several small islets lie close off its north-east shore.

Speaker rock, which covers at one quarter flood, lies 2½ cables N.E. from its eastern point, and is in the track of vessels using Current passage.

Race passage, to the southward of Helmcken island, is half a mile wide, but deep and clear of danger; the tide sets strongly through it (as much as 6 knots at springs), and there are some heavy tide rips in its eastern part. This is the passage generally used.

Current passage, to the northward of Helmcken, is about half a mile wide, and deep, the tide being as strong as in Race passage.

CHANCELLOR CHANNEL, which is 8 miles long and connects with Cardero channel, lies along the north shore of Thurlow island, and has its entrance abreast Helmcken island, between Eden point (the west extreme of Thurlow island) and the south shore of Hardwicke island; it is half a mile wide and clear of danger.

WELLBORE CHANNEL, separating the north-east side of Hardwicke island from the mainland, the entrance to which from Chancellor channel is nearly 3 miles north-east of Eden point, takes a W.N.W. direction for 4 miles, communicating with Forward harbour, Topaze harbour, and Sunderland channel. At its entrance is Bulkeley island, and the vessels using the channel should pass east of it, and keep the eastern shore on board to avoid some rocks which lie off the shore of Hardwicke island.

Tides.—The tidal streams in Wellbore channel run with great velocity, often attaining at springs a rate of over 7 knots an hour.

FORWARD HARBOUR,* on the eastern side of Wellbore channel, the entrance to which between Louisa and Horace points is only a little over a cable wide, extends nearly 3 miles in a north-east direction,

* *See* Admiralty plan, Forward harbour, No. 630; scale, $m = 4{\cdot}0$ inches.

and though the entrance is narrow, its freedom from obstruction renders it easily accessible to vessels of moderate size. Its shores are steep-to, but the water being of moderate depth over its whole extent (12 to 15 fathoms), anchorage may be taken up in any part of it, if requisite. At its head a flat dries out 2½ cables at low water, and two small streams flow into it.

For half a mile within the entrance the passage in is from one to 2 cables wide, with depths of 8 to 12 fathoms, but at that distance the harbour opens and varies from 3½ to 5 cables in width. Off Mills point, where the harbour commences to widen, there is a deep spot of 20 fathoms.

Anchorage may, as already mentioned, be taken up anywhere, but the best position is in Douglas bay, on the north shore, just round Mills point, in from 6 to 10 fathoms.

Tides.—It is high water, full and change, in Forward harbour at 3h. 0m.; springs rise 16 feet, neaps 11½ feet.

Bessborough bay, an open indentation on the north shore of Wellbore channel half a mile north-west of the entrance to Forward harbour, affords no anchorage, owing to the great depth of water in it.

SUNDERLAND CHANNEL.—The entrance, which is subject to heavy tide rips, lies between Fanny reef and the shore near Blinkinsop bay ; Sunderland channel is a clear navigable channel extending over 6 miles in a north-east direction to the entrance to Topaze harbour. Except at its entrance, where it is less than one mile wide, it is over a mile in width. Seymour and Poyntz islands lie in mid-channel, the latter near the junction of Sunderland channel with Wellbore channel (*see* page 209). The depths shoal gradually from 50 fathoms at the entrance, to 22 fathoms north of Poyntz island ; but there is a deep run of water in that locality and along the shore south of the two islands above mentioned.

Tides.—The tidal streams in Sunderland channel are not strong, attaining a velocity of only from one-half to 1½ knots an hour.

TOPAZE HARBOUR, the continuation of Sunderland channel, is, from its entrance (7 cables wide) between Murray island on the east, and the shore under Geneste Cone (1,400 feet high), on the west, nearly 5 miles long in a north-east direction, and nearly one mile wide, gradually narrowing, however, at its head to half a mile in width. Over the whole of this harbour there is an uniform depth of 13 fathoms until within half a mile of its head. On the north side, 1½ miles within the entrance, is Jackson bay, a narrow bight extending 1½ miles in a north-west direction but shoal at nearly a mile from its head.

At the head of Topaze harbour are mounts Drummond and Berkeley, 3,273 and 3,987 feet high respectively.

Anchorage may be obtained, well sheltered, in either Jackson bay or at the head of the harbour, in 10 fathoms.

Tides.—It is high water, full and change, in Topaze harbour at 3h. 0m.; springs rise 16 feet, neaps 11½ feet.

HARDWICKE ISLAND forms the north side of Johnstone strait for 7 miles to the westward of Thurlow island, and is separated from the latter by Chancellor channel. It is high and rugged, and the south shore steep-to, except near its south-west extremity, where Earl ledge runs off for 3 cables, only uncovering at low water.

York island, high round and about half a mile in diameter, and another small low islet half a mile westward of it lie off the west point of Hardwicke, and outside them, at the distance of one-third of a mile, is the Fanny reef, which covers or is awash at high water; between the reef and north shore there are some heavy tide rips.

BLINKINSOP BAY, on the shore of British Columbia, 2½ miles north-west of Hardwicke island, and 25 miles from Chatham point, is about 1⅛ miles deep, and half a mile wide; its shores are high, and from the head a bank dries out at low water for nearly one mile.

A shoal marked by kelp, on which there is a depth of 4 fathoms, lies one cable N.W. by W. from Tuna point, the east entrance point of this bay.

Anchorage.—This bay affords good anchorage, in 10 to 12 fathoms, about one-third of a mile N.E. from its south-west point, well sheltered and easy of access. The only direction required is to keep in mid-channel, avoiding the above-mentioned rock, and anchor on obtaining 12 fathoms, as the bank is rather steep.

Jesse island, lying about 2 cables off the shore, nearly half a mile to the south-west of Blinkinsop bay, is small and steep-to.

PORT NEVILLE,* the next opening west of Blinkinsop bay, is of considerable extent, running in a north-easterly direction for 7 miles, and varying from one-quarter to one mile in breadth. It affords a spacious and secure anchorage, but in consequence of Channel rock, lying near the middle of its entrance channel, great caution is required in entering. Its shores, except near the eastern side of entrance and head, are high, sloping gradually to the water's edge.

The entrance is between Milly island and Ransom point (off which is a small rock), thence the channel into port Neville is 1¼ miles long, and about 3 cables wide, running in a northerly direction; the depths in it vary

* *See* Admiralty plan of port Neville, No. 630; scale, $m = 4{\cdot}0$ inches.

from 5 fathoms, shoaling to 2¾ fathoms in the north part. The best passage is on the western side of Channel rock, there being about 17 feet at low water; the passage eastward of it has only 12 feet.

The depth of water in the port varies from 6 to 9 fathoms, with a muddy bottom; but in the shoalest part of the entrance channel, abreast Channel rock, there are not more than 2¾ or 3 fathoms.

Channel rock, of small extent and very dangerous, having only 4 feet over it, lies in the middle of its north part, 3½ cables S.W. ½ S. from Boulder point, so that unless vessels specially require to enter this port, the anchorage of port Harvey, and Blinkinsop bays, which are at no great distance from its vicinity, ought to be preferred, being both secure and easy of access.

Boulder point, the north-east point of the channel, is low, with a stony beach round it: a shoal extends off it to the northward and eastward for 5 cables, with 1½ fathoms in some parts.

Robbers nob is a remarkable low grassy point on the north side of the port, about one mile from Boulder point.

Anchorage.—To the westward of it is a shoal bay, into which flow some large streams; the best anchorage is about half a mile south-west of the nob in 6 or 7 fathoms. Temporary anchorage for a night may also be had at the outer part of the entrance, but the soundings decrease very suddenly when abreast Milly island.

Shoal creek, at the head of port Neville, is about 2 miles long, narrow, and not recommended, as its entrance is only one cable wide, with a rock in the middle; from its head a mud flat extends off nearly one mile.

Directions.—Entering port Neville after rounding Milly island, which is just S.W. of the entrance, and may be approached close to, proceed up mid-channel until Robbers nob comes in line with Boulder point bearing N.N.E. ½ E., when keep well over to the western side of the channel to avoid Channel rock. When Boulder point bears N.E. by E. the vessel will be clear to the north-west of the rock, and should then haul to the eastward to avoid a patch of 3 feet which skirts the western shore abreast Boulder point, after passing which, steer into the port N.N.E. ½ E., and anchor in 7 fathoms, about half a mile S.W. by W. from Robbers nob. If necessary a vessel may anchor in the entrance about half a mile north of Milly island in 4½ or 5 fathoms.

Tides.—It is high water, full and change, in port Neville at 0h. 30m.; springs rise 17 feet, neaps 12 feet: the stream runs from one to 2 knots at the entrance.

Slimpson reef.—The coast between ports Neville and Harvey trends in a W. by S. direction slightly indented. W. by S. ¼ S. 4 miles from the entrance of port Neville, and one-quarter of a mile off shore, lies the Slimpson reef, which covers at half flood.

PORT HARVEY,* the next inlet westward of port Neville on the north side of Johnstone strait, indents the coast in a northerly direction for 4 miles, with a breadth varying from one-quarter to three-quarters of a mile, and affords good and well-sheltered anchorage in 7 to 9 fathoms, muddy bottom, at half a mile from its head. There are several small islets (Mist) within it, and the shores are rugged; from its head swampy ground extends to the north-east, and to the north-west is a narrow gorge which partly fills at high water and joins Knight inlet. The depths in the entrance vary from 60 to 80 fathoms, shoaling rapidly towards the head.

Broken islands, off the east side of the entrance, are low, rugged, and of small extent; foul ground extends from them in a northerly direction for three-quarters of a mile, they may be approached, however, to within one-quarter of a mile on the west side, but only a boat passage exists to the eastward of them.

Havannah channel, the entrance of which is 1½ miles north of Broken islands, runs in a north-easterly direction from the east side of port Harvey, connecting it with Call creek. Its length is about 4 miles, and its breadth varies from one-half to one mile; the shores are high and much broken, and the depths in mid-channel vary from 9 to 50 fathoms. There are several islands within it, which lie mostly in mid-channel.

Hull island, the largest, is three-quarters of a mile long, and half a mile broad.

Boughey bay, in the south-east part of Havannah channel, is about one mile deep in a southerly direction, and half a mile broad; a vessel may anchor in this bay at half a mile from the head, in from 10 to 14 fathoms, but the passage to it has not been sufficiently examined to recommend its being used as an anchorage.

Browning rock, in the north part of Havannah channel, about one-third of a mile north of Hull island, has only 12 feet over it, and lies nearly in the fairway of the channel to Call creek; there is an apparently clear passage to the westward of it.

Caution.—As the soundings are uneven and the bottom rocky to the west and north-west of Hull island, great care should be used in navigating this channel near that neighbourhood.

* *See* Admiralty plan of port Harvey, No. 654; scale, m = 4·0 inches.

Call creek, the eastern termination of the inlet leading from Havannah channel, is an inlet of considerable extent, its length in a north-easterly direction being 12 miles, and its breadth varying from one-half to 1½ miles; the shores on either side are high and precipitous, rising abruptly to mountains from 1,000 to 4,700 feet in height. The head terminates in a low swamp, and a valley extends to the north-east from it.

Anchorage.—The depths in the entrance of Call creek are about 40 fathoms, but increase to upwards of 120 fathoms towards the head; there is no anchorage whatever except near its entrance, on the north side amongst the Warren islands, where from 6 to 14 fathoms will be found. These islands, four in number, and small, are half a mile from the entrance; they run parallel to the shore from one to 2 cables off it. A vessel may anchor between the two southern islands in from 6 to 10 fathoms.

Chatham channel, the east part of which commences at Root point, the north-west extreme of Havannah channel, trends to the westward, connecting these waters with Knight inlet; its breadth as far as surveyed varies from 2 to 3 cables, the depth in mid-channel is 4 fathoms at a distance of three-quarters of a mile west of Root point. It is not recommended to use this channel until further explored, as only 4 miles of it have at present been examined.*

Directions.—If intending to anchor in port Harvey, keep in mid-channel till within the Mist islands, when the anchorage opens out, and anchor in 7 fathoms in the middle of the harbour, at about half a mile from the head.

A sailing vessel of considerable size can beat in as far as Mist islands, and may stand anywhere to within one cable's distance of the west shore; in making the eastern board, keep outside the line of the Broken islands, and out of the bight between Transit point and the Mist islands.

The anchorages in Boughey bay, Havannah channel, and among the Warren islands on the shore of Call creek, are secure; but the passages to them, though probably deep, have not been sufficiently examined to give directions for entering them.

Tides.—It is high water, full and change, in port Harvey a 0h. 30m.; springs rise 10 feet.

Escape reef, lying 2 miles W. by S. ½ S. from Broken islands, and half a mile off the north shore of Johnstone strait, is about one cable in extent, has 4 feet least water on it, and is marked by kelp in the summer.

* Captain Vancouver's tender, the *Chatham*, a small brig, passed through this channel to the westward in July 1792, and the least water found was 3 fathoms.

This reef, which has deep water around it, is in the track of vessels entering port Harvey from the westward; to avoid it keep in the middle of the strait, till the entrance of the port comes well open, bearing N.N.E. or N. by E., when steer in for it.

FORWARD BAY, 3 miles W.S.W. from port Harvey, is a slight bend in the coast, about 1¼ miles broad, and three-quarters of a mile deep, with a small islet 30 feet high off its south-west point; its shores are moderately high, and a bank extends nearly 3 cables from its head.

Anchorage.—This bay affords good anchorage, in 14 to 10 fathoms, off the edge of the bank, at about two-thirds of a mile N.E. of its south-west point, well sheltered from all except south-easterly winds, and even these send in no sea; it is easy of access for any class of vessel, and a very good stopping place.

Caution.—Entering it from the eastward guard against the Escape reef.

Boat harbour.—From Forward bay, the northern shore of Johnstone strait becomes comparatively low, and trends W. by S. for 15 miles to Weynton passage, at the termination of the strait. Boat harbour, a small cove affording shelter to boats, is 6 miles westward of Forward bay, the coast between the two places being nearly straight, and may be approached to within a quarter of a mile.

HANSON and CRACROFT ISLANDS.—Between Boat harbour and Weynton passage the shores of Cracroft island are low and rocky. The island is about 15 miles long; and off its south-west part, at the distance of half a mile from the shore, and 2½ miles east from Blakeney passage, are the Sophia islets, of small extent. Hanson island is separated from Cracroft by a passage one mile wide; its south side is 3 miles long, and off its south-west point are some rocks extending 2 or 3 cables to the westward.

Growler cove indents the west end of Craeroft island in an E.N.E. direction for three-quarters of a mile, with a width of about 1½ cables, and from 20 to 5 fathoms water. At the head a flat runs out for a short distance. The Sophia islets lie off the south entrance point.

Directions.—For a steamer, or sailing vessel with a fair wind, the navigation of Johnstone strait is perfectly easy, it being only requisite to keep in mid-channel, except when nearing Helmcken island from the eastward, when a vessel ought, after passing Thurlow island, to keep within 3 cables of the southern shore, or Camp point, till past the Ripple shoal, which, from being marked with kelp, is likely to have less water

over it than has been found. In the vicinity of Helmcken the tides are strong, but not enough to stop a steam vessel of moderate power; to the westward of it they have no great strength.

If wishing to anchor for the night, Knox, Blinkinsop, and Forward bays, and port Harvey on the northern side, afford good anchorage, and are, with the present Admiralty charts, easy of access.

If beating through the strait, when to the eastward of Helmcken island, the shores on both sides may be approached to one cable, except for half a mile on either side of Pender islands, the south side of which latter ought not to be approached nearer than 2 cables, as the tide runs strong in their vicinity. Between Thurlow and the west end of Hardwicke island, it is not advisable to beat, as the tide thereabouts runs strong and irregularly, there being also several dangers in the track, viz., Ripple shoal and Speaker rock, east of Helmcken island; and Earl ledge to the westward of it. From Hardwicke island to Beaver cove, the south shore may be approached to one cable; and the only dangers along the north shore are the Slimpson and Escape reefs, which can be easily avoided by tacking short of them, keeping more than half a mile out when near the latter; elsewhere the north shore may be approached to within a distance of 2 or 3 cables.

BROUGHTON STRAIT, which connects Queen Charlotte sound with Johnstone strait, is upwards of 14 miles in length, east and west, the breadth varying from 4 miles at the east, to one mile at the west entrance. Its southern shore is formed by Vancouver island, and the northern by the south side of Malcolm island, and both, except near Beaver cove, are low. There are several islands, rocks, and shoals in the eastern part; but there is a clear navigable passage along the southern side half a mile wide in the narrowest place (abreast Alert bay in Cormorant island). There are several anchorages along both sides of the strait, available as stopping places,—Alert bay, on the south shore of Cormorant island; port McNeill on the Vancouver shore; and Mitchell and Rough bays on the south side of Malcolm island. The Nimpkish river, which disembogues on the south shore of the strait, is a stream of considerable size, and said to be navigable by canoes for a two days' journey.

At the eastern entrance of the strait the depths vary from 60 to 100 fathoms, decreasing rapidly to the westward; abreast the Nimpkish river are from 19 to 20 fathoms; but to the westward of it the bottom becomes irregular, the depths varying from 15 to 40 fathoms.

Tides.—In Broughton strait it is high water, full and change, at 0 hours 30 minutes, the rise and fall being 14 or 15 feet. In the navigable channel the streams run one to 4 knots, but in the Race and

Weynton passages 3 to 6 knots, turning everywhere about 2 hours after high and low water by the shore.

BEAVER COVE,* at the south-east extreme of Broughton strait, extends upwards of one mile in a southerly direction, and is half a mile wide; its shores are high, and the depth is too great for anchorage. Mount Holdsworth, a remarkable conical peak, 3,040 feet high, and very conspicuous from the eastward, rises 3 miles to the south-west of the cove.

Nimpkish river,† which flows into a shallow bay on the south shore, 5 miles westward of Beaver cove, is upwards of one cable wide at entrance, with 2½ fathoms, but only navigable for any distance by canoes; a bank dries off it for nearly one mile, leaving a narrow winding channel with about 5 feet water, into the river.

Green islet, off the outer edge of this bank, is about 4 feet above high water, and is small and bare; a rocky ledge which uncovers at low water, extends a distance of half a mile east from Green islet, and there is also an uncovering rock at the same distance west from it. In navigating the strait, this islet should not be approached within a distance of 3 cables.

On the north bank of the Nimpkish, at the entrance, is a small plateau of grassy land, on which are the ruins of the large native village of Cheslakee. The river flows through a broad valley bounded by high mountains for a distance of about 6 miles, and then enters lake Karmutsen, an extensive sheet of water 12 miles long.

PORT McNEILL, on the south side of Broughton strait, about 10 miles west from Beaver cove, runs in a W.S.W. direction for 2 miles, is three-quarters of a mile broad, and affords a good, well-sheltered anchorage in 6 to 9 fathoms. Its shores are low, and bordered by a sandy beach, which extends off three-quarters of a mile from the head. From Ledge point, the north point of entrance, a narrow ledge, with from 3 to 5 fathoms on it, extends 1¼ miles E.N.E. towards Haddington island; kelp grows over this ledge in summer.

Eel reef, lying 9 cables S.S.W. from Ledge point, and about 2 cables off the south shore of the port, covers at three-quarters flood.

Directions.—If intending to anchor in port McNeill keep half a mile from the southern shore when entering to avoid the ledge off Ledge point, and anchor when the point bears N.E., about 5 or 6 cables distant, in from 5 to 6 fathoms, sandy bottom.

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* *See* Admiralty plan of Beaver cove, on Sheet of plans, No. 2,067; scale, m = 3 ins.

† *See* plan of Alert bay and entrance to Nimpkish river, on Admiralty chart No. 2,067.

It is high water, full and change, at Nimpkish river at 0h. 50m.; springs rise 14 feet.

When leaving and bound to the westward, vessels should stand to the eastward until within half a mile of Haddington island before hauling to the northward round Ledge point.

The coast from port McNeill trends about W.S.W. 4 miles to the entrance of Queen Charlotte sound. It is bordered by a sandy beach, and may be approached to within a distance of 2 cables.

Pearse islands, in the centre of Broughton strait, at its eastern entrance, are a group of small low islands, with some rocks and reefs extending half a mile north-west, and nearly one mile south-east from them.

Blakeney passage, between Hanson island on the west and the west extremes of Cracroft and Harbledown islands on the east, varies in width from one mile to half a mile. It connects Johnstone strait with Blackfish sound. The strength of the tide in it is from 2 to 5 knots.

Weynton passage, between Hanson and Pearse islands, is about 1¼ miles wide, with depths in mid-channel varying from 40 to 60 fathoms. The shores on both sides are very much broken into rocks and small islands; the tide rushes through at the rate of from 5 to 6 knots; and unless wishing to anchor in Mitchell bay, it should not be used.

Race passage, between Pearse and Cormorant islands, is two-thirds of a mile wide, but a rock lies in mid-channel at its south part. The tides set at the rate of from 3 to 6 knots through the passage, and it is dangerous.

CORMORANT ISLAND lies in the centre of Broughton strait, to the west of the Pearse islands. It is about 150 feet high, 2½ miles long, east and west, three-quarters of a mile wide, and bordered by a sandy beach. Gordon point, its south-east extreme, is 2½ miles W. by N. from Beaver cove. A small patch of 4 fathoms marked by kelp lies 1¼ miles W. by S. from Leonard point, the north-west point of Cormorant island.

ALERT BAY,* on the south side of Cormorant island, is nearly one mile wide, and half a mile deep, affording a good and well-sheltered anchorage in from 6 to 9 fathoms, muddy bottom; it is easy of access, the shores being everywhere clear of danger. There is an establishment here for tinning salmon caught in the Nimpkish river; and a pier, at the extremity of which there is a depth of about 12 feet, extends from the north-eastern shore of this bay.

There is also a mission established, and quite a large Indian village, comprising most of the former inhabitants of Cheslakee. The house marked on the chart is a small one-storied house, with three windows towards the water. Near it is a very small chapel.

A supply of wood for steaming purposes may be obtained at Alert bay.

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* *See* plan of Alert bay on Admiralty chart, No. 2,067; scale, *m* = 3 inches.

Yellow bluff, the south-west point of the bay, may be recognised by a remarkable yellow cliff at the extreme of the point.

Tides.—It is high water, full and change, in Alert bay at 0h. 30m.; springs rise 15 feet.

Haddington island, 7 miles west of Beaver cove, in the centre of Broughton strait, is small; its south and west sides are steep-to, but from the northern shore a bar, with as little as 6 feet water in some parts, connects it with Malcolm island.

Between Haddington island and the ledge running off from the north point of port McNeil is a passage three-quarters of a mile wide, with not less than 7 fathoms water in mid-channel.

MALCOLM ISLAND, which forms the north side of Broughton strait, is 13¼ miles long W.S.W. and E.N.E., with an average breadth of nearly 2 miles; the shores are generally low, a sandy beach extending off a short distance from them. On its south side are Mitchell and Rough bays, in which vessels may anchor in 6 or 8 fathoms. Donegal head, its east point, is high, cliffy, bordered by a beach, and the tide runs strong in its vicinity. Dickenson point, on the south side of the island, 7 miles westward from Donegal head, is connected to Haddington island by a bar, with only 6 feet on it in some parts.

Trinity bay, on the north side of Malcolm island between Lizard and Boulder points, is an open bay 2½ miles wide and one mile deep. Between the points of the bay the water shoals steeply from 40 fathoms to a ledge having 10 fathoms on its outer edge, but which again shoals rapidly, and is covered with kelp.

Anchorage may, with care, be picked up on the outer edge of this ledge, in 7 fathoms, with Lizard point bearing E. by N. and Black bluff S.W. by W., 2 cables outside the kelp; but it is exposed to winds from the westward, between North and S.W.

Kelp patch.—Foul ground marked by kelp extends half a mile off the west side of Malcolm island; and 1⅓ miles W.N.W. from Pulteney point, its south-west extreme, is a shoal patch of 4½ fathoms, also marked by kelp.

Directions.—Passing through Broughton strait from the eastward, when abreast Beaver cove, in mid-channel, a W. ¼ S. course, to pass not more than 2 cables south of Cormorant island, will keep a vessel clear to the northward of Nimpkish bank, and when the west point of Cormorant island bears N. by E. she will be westward of it; then steer to round the south-west point of Haddington island within a quarter of a mile, to avoid the ledge off Ledge point, and when the north shore of Cormorant island

opens of Haddington island bearing E. by N. ¼ N., a vessel may steer out of the strait in mid-channel. None, except small craft, should go to the northward of Haddington island.

Sailing vessels of any size would find it tedious to beat through this strait, and as there are several dangers it is not recommended to do so.

QUEEN CHARLOTTE SOUND is an extensive arm of the sea, connecting the inner waters north of Vancouver island with the Pacific. Its length is upwards of 30 miles, running in an easterly direction, and its breadth varies from 10 to 20 miles, being bounded on the north by the shores of the mainland of British Columbia, and on the south by the north shore of Vancouver island. In the north and north-east parts are innumerable rocks and islands; but along its southern sides are two broad and navigable channels to the Pacific.

Broughton strait enters this sound at its south-east part. From thence to Thomas point the coast of Vancouver trends W. by N. for 9 miles, and is low; it is bordered the whole distance by a beach composed of sand and boulders, and foul ground marked by kelp extends off it, from one-quarter to half a mile.

If intending to enter Beaver harbour from the eastward, do not approach this shore within a mile till near Thomas point; and as but very few soundings have been obtained in this part of Queen Charlotte sound, if beating to windward, great caution ought to be observed when standing to the northward.

SU QUASH ANCHORAGE.*—At 7 miles west from port McNeill, the south shore of Queen Charlotte sound is bordered by shoal ground, extending 4 cables off, and on which anchorage may be had in from 2½ to 4 fathoms. Care, however, must be observed when anchoring here, as reefs which dry at low water and shoal patches lie scattered about.

There is a coal mine here and a pier for loading at.

Anchorage.—The best berth is with the pier head bearing S.W. ¾ W., distant 2½ cables, in 2½ fathoms water; half a mile from the pier on the same bearing the depth is 7 fathoms.

Tides.—It is high water, full and change, at Su quash anchorage at 0h. 30m.; springs rise 16 feet.

BEAVER HARBOUR,† on the south side of the sound, 9 miles westward of Broughton strait, is 3 miles wide at entrance and 2 miles deep. The harbour is protected by several islands lying across, and within the entrance; its shores are low, and from the south shore a bank extends off

* *See* plan of Su quash anchorage on Admiralty chart, No. 581; scale, *m* = 6 inches.

† *See* Admiralty plan of Beaver harbour, No. 2,067; scale, *m* = 3 inches.

3 or 4 cables; a short distance inland from its western side are seven remarkable hills, varying in height from 400 to 640 feet. There is good anchorage in the south and west parts of the harbour, but north-easterly winds send in a heavy sea, rendering it impossible to land in ships' boats on the south shore for days together.

On the south shore is fort Rupert, formerly a Hudson Bay Company's trading post, and which existed as such for many years in charge of a chief trader; but the company have now abandoned it. The fort was formerly a strong stockaded structure, mounting cannon, but it is now rapidly falling into decay.* Adjacent to it is a small quantity of clear land, also a very fine garden, where fruit, and vegetables common to the climate, were formerly grown in great abundance. In the vicinity of the fort is a large native village. Landing here is bad, owing to the beach extending out shoal for some distance, and the bottom is very foul.†

In the vicinity of Beaver harbour the yellow cypress abounds; it is also found on all parts of the north coast of Vancouver island, and at intervals on the main land from Knight inlet westward.

This tree yields lumber of the finest texture, very hard and durable (good for boats), it is possessed of a peculiarly pleasant odour, and repels the attack or presence of the *teredo navalis:* on this account it is highly prized by the cabinet makers, and the ship builder.

Thomas point, the south-east extreme of the harbour, is low and rocky; some rocks lie upwards of 2 cables off it to the westward. The channel between it and Deer island is about 4 cables wide, with from 13 to 6 fathoms, and clear of danger.

Moffat rock, 8 cables to the westward of Thomas point, is 3 cables off shore, just at the outer edge of the bank, and uncovers at low water.

Deer island, two-thirds of a mile north of Thomas point, is about 1½ miles in circumference, wooded, and about 240 feet high; its shores are rocky, and extending nearly 4 cables off its north-west part is a reef marked by kelp, with only 9 feet water over it. Eagle island lies close off its south-east point, with a small rock, 15 feet high, not more than a quarter of a cable from its southern extremity.

Twin rock lies midway between Round and Peel islands; a reef extends for more than one cable from its east and south ends, the latter being nearly connected with the shoal extending from the north end of Deer island.

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* Commander Stanley, R.N., H.M.S. *Petrel*, 1873.

† Earthquake at fort Rupert on 25th August 1865 at 9.10 p.m. A strong earthquake shock occurred which caused H.M. surveying vessel *Beaver*, at anchor in 12 fathoms, to tremble violently. The night was clear, calm, and cool. Great consternation was caused amongst the natives at the Indian village. This shock was also felt simultaneously at the head of Rupert arm in Quatsino sound on the west coast.

Round island, half a mile N. by E. of Deer island, is small, but high, and conspicuous from the eastward.

Peel island, 200 feet high, in the north part of Beaver harbour, is three-quarters of a mile long S.W. and N.E., about one-third of a mile broad, and between it and the west shore of the harbour is a passage 2 cables wide in the narrowest part, with 17 fathoms water; at 4 cables north of it are the Charlie islets, small, and two in number. There is a good channel into the harbour close along the east side of Peel island, which is steep-to.

Cattle islands, which lie in the middle of the harbour, are small and connected with each other at low water, and at 1¾ cables, N.N.W. of the islands, there is a shoal of 3 fathoms.

Shell islet.—At 1½ cables south of them is Shell islet, the observation spot on its top is in lat. 50° 42′ 36″ N., long. 127° 25′ 07″ W.; a reef awash at high water lies one cable south of it.

Cormorant rock, lying one-third of a mile off the western shore of the harbour, and nearly half a mile west of Shell islet, covers at high water, and has from 4 to 6 fathoms close-to; midway between this rock and Cattle islands is a shoal patch of 3¼ fathoms.

Dædalus passage, leading from the west part of Beaver harbour to the northward, is 2 cables wide in its narrowest part, and has not less than 17 fathoms in mid-channel. The mid-channel course should carefully be preserved, especially in the narrowest part west of Peel island where the deep channel is only about 1½ cables wide.

Dillon point, the north-west extreme of the harbour, and separating it from Hardy bay, is bold and rocky; some small islets lie to the south-east of it close in shore.

Directions.—Beaver harbour is easy of access to sailing vessels as well as steamers. There are three passages into it, but the southern between Thomas point and Deer island is the best, and generally used. This channel is wide enough for a vessel to beat through; and the only caution required in entering it, is not to round Thomas point nearer than 2 cables in order to avoid the rocks off its north-west part, after passing which steer for Shell islet.

If entering the harbour by the Dædalus passage, steer in mid-channel; passing between Cormorant rock and the 3¼ fathom shoal 1½ cables eastward of it. A sailing vessel could not easily work through it, however, as the breadth abreast Peel island contracts to about 1½ cables.

Anchorage.—Anchor in 10 to 12 fathoms about 2 cables south-east from Shell islet, with fort Rupert bearing S.S.E. and Thomas point East, or E. by N. Good anchorage in from 6 to 9 fathoms, and better sheltered from all winds, may be obtained westward of the Cattle islands: but in rounding Shell islet give it a berth of about 2 cables to avoid the reef south of it.

Tides.—It is high water, full and change, in Beaver harbour at 0h. 30m.; springs rise 15¾, neaps 11½ feet.

HARDY BAY, to the westward of Beaver harbour and only separated from it by Dillon point, indents the coast in a southerly direction for 4 miles; its breadth at the entrance is two miles, narrowing to the head, where it terminates in a narrow creek 1¼ miles long, and 2 to 4 cables broad, with a sand-bank extending off its head for three-quarters of a mile. The shores of the bay are rugged, and off the west side, near the head, are some outlying rocks. The depths in the outer part of the bay vary from 100 to 40 fathoms, and there is no anchorage, except in the small creek at the head, which is difficult of access, and should not be used by a stranger.

Masterman islands, off the north-east point of the bay, about three-quarters of a mile from the shore, are small, moderately high, wooded and four in number; foul ground exists between them and the shore.

The eastern shores of QUEEN CHARLOTTE SOUND consist of an archipelago* 12 miles in length, extending from Hanson island (*see* page 215) on the south, to the entrance to Fife sound on the north. Between the numerous islands, islets, and rocks which form this archipelago, are many narrow channels leading to the entrances of extensive chasm-like inlets, in which the water is of great depth, and whose shores rise in almost sheer precipices to a height of from 5,000 to 6,000 feet, and further inland to stupendous peaks, clad in perpetual snow. Down the barren, rugged sides of these mountains rush numberless cataracts, caused by the melting snow. The intense dreariness and gloom in these inlets, and the almost entire absence of life, cause them to present a most unnatural and weird aspect.

BARONET PASSAGE.—From Blakeney passage (*see* page 218) along the north shore of Cracroft island, between it and Harbledown island is a narrow channel 6 miles long, known as Baronet passage. At this distance it splits into several small passages, lying between many small islands, islets, and rocks, the navigation of which must be undertaken with considerable caution.

Kelp rocks lie just within the entrance to Baronet passage, on the north shore, and extend over 2 cables off shore in some places, two of them uncovering at low water 8 and 3 feet respectively; they leave a channel 1½ cables wide along the south shore in which is a depth of 10 fathoms. From here the passage is clear as far as Channel island, 4 miles from the entrance, and maintains an uniform depth of 8 fathoms. The channel on either side of Channel island is less than one cable wide, that to the northward being the deepest.

Steamer passage, between the islands above mentioned, as lying 6 miles from the entrance to Baronet passage, is one cable wide, with

* The Broughton archipelago of Vancouver. *See Vancouver's Voyages, Vol. I.*

depths of 10 to 15 fathoms in it. Great care must be observed when passing through Steamer passage, as a dangerous rock, awash at low water, lies a little over 2 cables N.N.W. of it.

CLIO CHANNEL, the continuation of Baronet passage, to the north-east along the north side of Cracroft island, between it and Turnour island, and communicating with Knight inlet, is 7 miles long, and clear of danger throughout, with the exception of the Negro rock (awash at low water), lying in the fairway half a mile S.W. by W. from Sambo head, and to avoid which the south-east shore of Turnour island should be kept on board at about 2½ cables distant. Thence the passage out into Knight inlet is clear and safe.

Lagoon cove, a small sheltered nook on the north side of Double islands, 2 miles to the south-east of the junction of Clio channel with Knight inlet, affords anchorage for a small vessel in 10 fathoms. When entering, pass in mid-channel between the north shore of Double islands and a small round island northward of them, but do so with caution. From the head of Lagoon cove a chain of lakes connect the cove with port Harvey (*see* page 213).

HARBLEDOWN ISLAND, forming the northern shore of Baronet passage, is 6½ miles long, in an E.N.E. and W.S.W. direction, and 3 miles across at its broadest part, its highest elevation (over Baronet passage) being 1,240 feet.

Parson bay, on the west side of Harbledown island, is a spacious bay 1½ miles deep in an easterly direction, and three-quarters of a mile wide, shoaling gradually from 30 fathoms just inside the entrance to 14 fathoms at its head.

Anchorage may be obtained in 14 fathoms, mud, at the head of Parson bay, in the south-east corner, well sheltered from all but westerly winds blowing down Blackfish sound, in which direction it is open.

Compton island, three-quarters of a mile long east and west, is 380 feet high and triangular in shape. It is separated from Harbledown island by White Beach passage. In a bay on the south side is an old village.

Berry island, to the north-east of Compton island, is nearly one mile long and forms the east side of Farewell harbour.

Lewis island is separated from Berry island by Village passage; it is 2¼ miles long, and forms the north side of Farewell harbour, and the entrance to Knight inlet lies along its northern shore.

BLACKFISH SOUND, between the north ..e of Hanson island and Swanson island, has an average width of . . miles, and leads

from Queen Charlotte sound into Parson bay and Blakeney passage to the south-east, and to Farewell harbour and White Beach passage to the northward. There is deep water all over the sound, and it is entirely free from dangers.

Swanson island, forming the north shore of Blackfish sound, is 2½ miles long, east and west, and one mile wide, with regular bold shores, and only one or two small indentations. Harbour cone, at its east end, is 510 feet high. Numerous small islets and reefs lie off the north shore of the island for the distance of nearly one mile.

Freshwater bay, on the south side of Swanson island, about 4 cables to the westward of the southern entrance into Farewell harbour, affords anchorage for small vessels in 6 fathoms, but it is exposed to southerly winds.

FAREWELL HARBOUR,* formed between the east shore of Swanson island on the west, Lewis island (on the north), Berry island (on the east), and Compton island (to the south), is a snug anchorage for a small vessel, half a mile across in every direction. Its approaches, however, both from the northward and southward, are only half a cable wide, that to the northward from the main entrance to Knight inlet (between Swanson and Lewis islands) being obstructed by the Twilight reefs and several islets lying half a mile outside it. Entering through North passage, Charles point (the west entrance point), kept touching Maggy point (the southern point of North passage on the eastern shore), bearing S.S.E., clears the Twilight reefs, passing eastward of them.

The southern entrance, named West passage, between Punt rock and Apples island (lying close to the shore of Swanson island), and the Star islands lying off the north-west shore of Compton island, leads out of Blackfish sound and must be approached with caution, as shoal ground extends 2 cables in a south-west direction from the latter islands, having on its extreme a depth of 4 fathoms, leaving a passage to the east of Punt rock only half a cable wide,

Twilight rock, awash at high water, lies 7 cables N.W. by N. from Charles point (the north-west entrance point of Farewell harbour), and 2 cables W. ½ N. from it is Chick reef, one cable in extent, and drying 4 feet. To the westward of the above dangers is a group of small islets and reefs extending along the whole of the north shore of Swanson island to the distance of nearly a mile from it.

Directions.—The southern entrance, which should only be taken by a small vessel, should be approached on a N.E. ½ N. bearing, passing

* *See* plan of Farewell harbour on Admiralty chart, No. 581; scale, $m = 2 \cdot 5$ inches.

three-quarters of a cable from Bare rock (10 feet high) at the east side of Freshwater bay, 2½ cables S.W. from Punt rock; on this bearing Stripe island, a small island on the north shore of the harbour, should be seen midway between Apples and Star islands. When abreast of Apples island haul gradually to the eastward and anchor in 18 fathoms in the middle of the harbour, with north point of Star islands bearing W. by S. ½ S. and Maggy point N. by W. ½ W., distant 1½ cables from Compton island.

If it can be clearly made out, the north extreme of Kamux island open a little north of the north-west Star island, bearing N.E., will clear the shoal ground extending south-west of the Star islands.

Tides.—It is high water, full and change, in Farewell harbour at 1 hr.; springs rise 15 feet, neaps 8 feet.

Village passage, between Lewis and Berry islands, is a narrow but apparently clear channel 1¼ cables wide, leading out from the north-east part of Farewell harbour, north of the Carey group, to Native anchorage.

White Beach passage, between Compton island and the north-west point of Harbledown island, is in its narrowest part only 80 yards across, and must be used with great caution. This passage also leads up through Indian passage, south of the Carey group, to Native anchorage.

Village island, 3 miles long and 787 feet high, is situated 2 miles to the eastward of Lewis island, and is bounded on the north by Knight inlet and separated from Turnour island on the south-east by Canoe passage. The space between Lewis island and Village island is occupied by the Indian islands. A narrow pass, Elliot passage, leads into Knight inlet, between the easternmost of these islands and Village island.

Carey group, a chain of several small islands lying to the southward of the Indian islands, and stretching across from Berry island to Turnour island, a distance of 3 miles.

Turnour island is 9 miles long E.N.E. and W.S.W., and at its centre 3 miles wide, narrowing towards its extremities; at its eastern end it is 1,580 feet high. It is separated from Harbledown island on the south by Beware passage, Clio channel running along its south-east side, and Knight inlet along its north-west side the junction of these two passages taking place at Bold bluff, its north-east point.

Native anchorage.—At the south-west end of Village island is Mamalilaculla village, and at the mouth of a small bay to the south-eastward of it, at the entrance to Canoe passage, is Native anchorage, with from 7 to 8 fathoms water. Hail islands, two small islets, lie to the southward of it, and Chart and Cecil islets to the westward.

Beware passage, lying between the north-east shore of Harbledown island and the south-west shore of Turnour island, leads from Native

anchorage eastward into Clio channel. Though the greater part of it is clear, vessels cannot pass through it into Clio channel, owing to a barrier of islets and rocks which stretch right across it, at one mile from its junction with that channel. An Indian village (Karlukwees) is situated on Turnour island at the eastern entrance to Beware passage.

Canoe passage is a narrow pass leading from Native anchorage along the south-east shore of Village island, between it and Turnour island. At two miles up it is completely closed at low water by a stony barrier which dries right across, and it is only available for canoes at high water.

KNIGHT INLET.—The Main Entrance to this inlet, which is one of the most extensive of the sea canals of British Columbia, lies northward of Swanson, Lewis, and Village islands, between them and Midsummer island and several smaller islands and rocks. Off the entrance the water shoals, forming a bank on which there is from 20 to 30 fathoms, but deepening again as Bold point (the west point of Swanson island) is passed. Inside Bold point the depths are irregular from 31 to over 40 fathoms, but to the eastward of Village island the water deepens to more than 100 fathoms.

The main entrance to Knight inlet lies 3½ miles E.N.E. from Donegal head, the east extreme of Malcolm island, and may be easily recognised by White Cliff islands, a chain of small islets of a whitish colour situated on the northern side of the passage into the inlet. The entrance between Wedge island on the north, and the north-west shore of Swanson island on the south, is 3½ cables wide, and clear of danger, but farther east Twilight reefs and Clock rock must be avoided; the former is 1½ miles, and the latter 5 miles from Wedge island. These dangers should be passed to the northward, and Jumble island, lying between them, to the southward, after which a mid-channel course should be preserved until east of Lady islands, when the shores of the inlet may be approached to within a moderate distance. The entrance proper to Knight inlet, between Warr bluff on the south and Slope point on the north, is three-quarters of a mile wide, and 5½ miles from Wedge island. From hence the inlet trends in a general E.N.E. direction for 33 miles, and then turns suddenly to the northward for 26½ miles to its termination, with an average width throughout of 1½ miles. The shores of the inlet are generally bold, and formed by high mountains rising precipitously from the water's edge, and down the sides of which rush many cataracts produced by the dissolving snow. The water is everywhere deep, except at a spot about 7 miles eastward of Sargeaunt passage, where a rocky ridge was found to extend across the inlet, and on which there are heavy overfalls, but no less depth than 23 fathoms was obtained. There are but few places that afford anchorage; port Elizabeth on the north shore, and Glendale cove on the south being the only two that may be considered available. At 11½ miles east of Slope

point Tribune channel branches off to the northward, and embracing Gilford island, connects with Fife sound and Sutlej channel, which diverging on either side of Broughton island, lead into Queen Charlotte sound, the former 7 miles N.N.E. and the latter 15 miles N.W. by W. ½ W. from the entrance to Knight inlet.

On the south side, Knight inlet is connected with Johnstone strait by two passages, viz., Clio channel and Baronet passage, and Chatham and Havannah channels, which turn off at 10 miles from the entrance on either side of Minstrel island, the former to the south-westward and the latter winding first to the south-east, and then to the south.

Tides.—The tides at the entrance to Knight inlet run at the rate of from one to 3 knots.

Wedge island, a small round island two cables in extent, lies 3½ cables to the N.N.W. of the north-west shore of Swanson island, the channel into Knight inlet lying between them; it is clear of danger, and may be boldly steered for, passing in mid-channel between Wedge island and the small islets lying close to the shore of Swanson island.

White Cliff islands.—From Wedge island at the main entrance to Knight inlet a line of small islets, named White Cliff islands, extends for over a mile in a N.W. ¾ N. direction with patches of shoal water between. A rock awash at high water lies nearly one cable north-westward from the northern islet.

White Cliff islands are the key to the entrance to Knight inlet, amongst a number of islands all of the same size and colour (pine trees).

These islands by their colour, as indicated by their name, form a very conspicuous object, and would be most useful for a stranger to identify the entrance to the main channel of the inlet.

The southern White Cliff island is situated in latitude 50° 38′ 40″ N., longitude 126° 44′ 20″ W.

Surge rocks are a small group of rocky islets lying 3 cables N.N.E. from Wedge island.

Midsummer island, separating Knight inlet from Spring passage, is 650 feet high, 3 miles long, and one mile wide.

Owl island, one mile in length, east and west, and about half a mile broad, lies off the west end of Midsummer island, with a narrow passage (Providence passage) between them.

Passage islet is a small round islet, about midway between the Surge rocks and the shore of Owl island. From the northern islet of the White Cliff islands another channel leads into Knight inlet on either side of Passage islet.

Twilight reefs, which uncover only 4 feet at low-water springs, lie one mile E. by N. ½ N. from the main entrance to Knight inlet, at

from one to 1¼ cables northward of a group of small islets on the south side of the channel. To clear them keep Coast cone (a conical hill on the north-west shore of Village island) in line with the south shore of Jumble island, bearing N.E. by E. ¾ E. (easterly).

Jumble island is half a mile long (east and west), and lies 2 miles E.N.E. from Wedge island. On its west side is Night islet, and off its east point, lie the three small Bush islets. When within 2 cables of Night islet haul to the eastward to pass at that distance southward of it, Jumble island, and the Bush islets.

Indian islands lie on the south side of Knight inlet, between Lewis and Village islands. Between them are several small channels leading to Native anchorage (*see* page 226), but only the easternmost, Elliot passage, is navigable, and that only by small vessels.

Clock rock, which covers at half-flood, lies 2½ cables north of the easternmost of the Indian islands, and is especially dangerous to vessels going through Elliot passage. To clear it keep the coast of Village island on board at 2 cables distance.

Leading mark.—Passing up or down Knight inlet, the Clock rock may be safely passed by keeping Leading point (on the north shore) in line with Ripple bluff (the north extreme of Village island) bearing N.E. by E. ¾ E.

Ridge islands lie on the north side of Knight inlet between the east end of Midsummer island and the south-west shore of Gilford island, at the entrance (from Knight inlet) of Spring passage.

A rock which dries 8 feet at low water, lies 3 cables from the shore of Gilford island; it is, however, out of the fairway of vessels passing up and down Knight inlet, but should be carefully avoided by those passing through Spring passage.

Chop bay is a small bight on the north side of Knight inlet opposite Ripple bluff.

Tide rip.—Heavy tide rips occur off Ripple bluff, and between it and Leading point, on the opposite shore, the tidal stream runs at a rate of from 2 to 3 knots an hour.

Lady islands, situated 3 miles north-eastward of Leading point, the largest of which is one mile long, but narrow, with several small islets lying off their west extreme, consist of two islands with deep water on both sides of them.

PORT ELIZABETH.—North-westward of the Lady islands a large bight branches off to the north-west, curving round to the south-west and opening out at its head, forming a sheltered anchorage named port

Elizabeth, about one mile in extent; but which is, however, somewhat contracted by two small islands lying in the middle.

Duck cove, to the south-west of these small islands, forms the termination of the port, a flat dries off its head nearly half a mile.

The entrance to port Elizabeth is one mile wide, contracting gradually to 3½ cables at 1½ miles inside. In this channel the water is deep, but having passed the narrowest part of the entrance channel, the depths shoal to 25 fathoms, and thence gradually to the shores of the port.

Anchorage may be taken up as convenient in the southern part of the port in from 9 to 4 fathoms; the latter depths being found south of the eastern island, midway between it and the shore.

Minstrel island, lying to the eastward of Turnour island, at the junction of Clio and Chatham channels with Knight inlet, is 1,530 feet high, and 1¾ miles long W.N.W. and E.S.E., and one mile wide. Between the south side of Minstrel island and the opposite shore of Cracroft island a deep bight is formed, in the centre of which is Double island, two small islets connected at low water with each other, and also with the shore to the eastward, forming to the northward Lagoon cove, 2½ cables wide, and in which there is anchorage in 10 fathoms (*see* page 224). At the head of the cove there is a chain of lakes leading to port Harvey.

Chatham channel, on the south side of the inlet, 3½ miles eastward of the Lady islands, has its entrance between White Nob point (Minstrel island) and Littleton point, where it is over half a mile wide. Thence the channel takes a south-easterly direction, and gradually contracting in width and shoaling, it, at 4 miles from the entrance, joins the head of Havannah channel.

Cutter creek, a narrow bight on the east shore of Chatham channel 1¼ miles deep, in a north-east direction, terminating in marshy land bordered by a sand-flat, would afford anchorage to a small vessel in 6 fathoms, but caution must be observed when entering, as a small islet (Block islet) lies in mid-channel at entrance, leaving a passage less than one cable wide on each side of it, that to the south being the best.

Shewell island, lying on the north side of Knight inlet, 2 miles from the entrance to Chatham channel, is 1¼ miles long (north-east and south-west) and 280 feet high; it lies at the southern entrance to Tribune channel, which it divides into Clapp and Nickoll passages, both being clear of danger (*see* page 239).

Viscount island, forming the eastern side of the southern entrance to Tribune channel, is 1,950 feet high, 3 miles long north and south, and one mile wide.

Sargeaunt passage (Pumish), one mile east of Nickoll passage, is a narrow pass on the east side of Viscount island 2¾ miles long, and communicates with Tribune channel.

Tides.—It is high water, full and change, in Sargeaunt passage at 1h. 0m.; springs rise 15½ feet, neaps 12 feet.

Anchorage.—Fair anchorage may be obtained on either side of the passage. It is contracted to 220 yards, where the depth is 11 fathoms at low water. The least water in the kelp patch is 3½ fathoms.

Toa ko nu cove, on the south side of the inlet round Protection point, is probably too deep for anchorage.

Hoeya sound, on the north shore of Knight inlet, 7 miles from Protection point, is a bight half a mile wide, indenting the coast in a N.E. by E. direction. There are depths of over 40 fathoms over the greater part of the sound, but it shoals suddenly to 5 fathoms at 1½ cables from its head.

Prominent point, on the south shore of Knight inlet, opposite the entrance to Hoeya sound, has a rocky ridge of less water than in the centre of the inlet, extending northward from it, on which there are heavy overfalls; the least depth obtained during the survey was 23 fathoms.

Knight inlet, from Prominent point, trends in a N.E. by E. ½ E. direction for 11 miles, still maintaining its great depth of water, but narrowing at that distance to only a little over one mile across from Sallie point to Macdonald point.

Glendale cove (Kiokh), on the south shore of the inlet, immediately eastward of Macdonald point, takes a S.S.E. direction for 1¾ miles, and is three-quarters of a mile wide at its entrance. It dries about half its length, and the water in the remaining part is deep.

A river flows into the head of Glendale cove from a sheet of water one mile distant, named Tom Browne lake, about 5 miles long, which extends nearly to the head of Topaze harbour.

Anchorage may, with care, be taken up in the south-east corner in 23 fathoms, with the right extreme of Observation point in line with Rapid hill, and a large boulder on west side in line with the junction of Flora and Macdonald ridges, but the bank is very steep-to.

Knight inlet, from Glendale cove, winds in a general northerly direction for 20 miles to Axe point, and has a nearly uniform width of 2 miles throughout this distance. The mountains on both sides attain an altitude of from 5,000 to 6,000 feet, and the depth of water is very great, there being no bottom at 126 fathoms in mid-channel.

Glacier.—On the east shore, at 14 miles from the head, over a gully, under Glacier peak, there is a remarkable glacier a short distance from the sea. Anchorage was tried for, but no bottom was obtained at one cable from the shore with 40 fathoms of line.

From Axe point the inlet trends nearly straight in a north-west direction for a further distance of 8 miles, the total length of this peculiar chasm being 65 miles. At its head it somewhat widens, but maintains its great depth close up to the mud flat, which extends about half a mile from the shore of the marshy ground at the foot of the valley in which Knight inlet terminates. In the valley near a stream is Tsauwati village, frequented during the summer months by large numbers of Indians for the purpose of making fish oil. Mount Blair, immediately over the head of the inlet, attains an altitude of 6,550 feet.

Wah shih las.—At 4½ miles from the head of Knight inlet on the west shore affords the only place where an anchor could be dropped, and by securing to the trees by a hawser, in a depth of 30 fathoms close to the south shore, on west side of the bay.

Fire islands, consisting of one large and four small islets, lie close to the west end of Owl island.

Escape, Canoe, and House islands.—From the west end of Midsummer island several small islands extend in a north-west direction for 1¼ miles, with rocks between some of them. The largest, Escape island, lies close off the shore of Midsummmer island. House island, the north-west of the group, is merely a round rock, but reefs extend over 2 cables east and west from it.

Sedge, Start, and High islands are the southern and largest of numerous small islands, islets, and rocks lying off the south-west end of Bonwick island. Several patches of rock lie off and between them, but a clear passage, half a mile wide, exists between Sedge islands and House island, leading into Retreat passage.

Green rock, 25 feet high, lies $1\frac{1}{10}$ miles E.N.E. from House island; another small rock lying 1½ cables westward of it.

Spring passage, between the south-west end of Gilford island and the north shore of Midsummer island, leading from Retreat passage into Knight inlet, is about half a mile wide, but at the eastern end the channel is contracted by Broken islands to a width of 3 cables; the passage being to the north of these islands. Ridge islands lie across the eastern entrance of the passage.

Retreat passage, an entrance to which, as above mentioned, lies between House and Sedge islands, extends in a northerly direction, between Bonwick and Gilford islands, for 6 miles. Along the shore of Bonwick

island, which is bold-to, it is a clear navigable passage; but the eastern shore is skirted by several small islands, islets, and rocks, between which a vessel should not pass.

Seabreeze island is the largest and most southern of the islands on the eastern shore of Retreat passage. Whale rock, 3 feet high, lies 4 cables north-east from Seabreeze island, nearly midway between it and Yellow rock at the entrance to Health bay.

Health bay, on the eastern shore, a bight one mile deep in a south-east direction, may, however, be safely entered by passing in mid-channel between the south end of Sail island (which lies off the entrance) and Yellow rock, 2½ cables south of it, or midway between the latter and the shore, when convenient anchorage in 9 to 10 fathoms may be obtained. A narrow passage in the north-east corner of the bay communicates with a lagoon.

On the east shore of Retreat passage, north of Sail island, are the remains of an Indian village.

Grebe cove, a narrow bight, one to 2 cables broad, on the west shore, extends one mile in a W.S.W. direction, shoaling gradually from 18 fathoms off its entrance, to 6 fathoms at its head.

Camp bay, on the east shore opposite Grebe cove, is too small, and has too great a depth of water in it, for anchoring in.

Fox islands.—The north end of Retreat passage opens out into a space about 2 miles across, bounded by Mars and Tracey islands on the west, Baker island on the north, and Gilford island on the east. In the middle of this space, extending right across from the north end of Bonwick island to the south shore of Baker island, are the Fox islands. There is a clear channel east of the Fox islands up to the entrance of Cramer passage, passing midway between the eastern islet of the chain and Solitary island.

CRAMER PASSAGE, between the south-east shore of Baker island and north-west shore of Gilford island, leading from Retreat passage north-eastward into Fife sound and to Shoal harbour, is a clear navigable channel, 2 cables wide at its southern entrance, between Steep island and Islet point; from thence it extends 2 miles N.E. by E., and then turns suddenly to the N. by W. for one mile to its junction with Fife sound, the width increasing to three-quarters of a mile. A sunken rock lies 1¼ cables west from Powell point, the north-east entrance point of the passage.

At the northern entrance, at the distance of 1½ cables from the west shore, is a sand patch, about 2 cables in extent, with from 9 to 16 fathoms water on it. By preserving a mid-channel course the passage may be boldly taken.

Shoal harbour, on the east shore of Cramer passage, is a narrow inlet 1¼ miles long (east and west), to which access is gained by a channel 150 yards across from shore to shore, in some parts less than 40 yards wide between the 3-fathom lines, and in which there is a depth of only 3¾ fathoms. This channel is 3½ cables long in a south-easterly direction, Mink point being its southern termination on the eastern side. The western half of the harbour has only from one to 2 fathoms water over it, but over the greater part of the eastern portion there is a depth of 4 fathoms. A bank which dries, and through which flows a small stream, extends more than a quarter of a mile from the head of the eastern arm. Shoal harbour is only safely available for small coasting vessels with local knowledge, but in the event of its being necessary to enter, a small vessel may, with care, do so by keeping at 50 to 60 yards from the eastern shore of the passage in, and anchorage may be taken up in 4 fathoms abreast Mouse island (on the northern shore) about 1½ cables eastward of Mink point.

Tides.—It is high water, full and change, in Shoal harbour at 1 hr.; springs rise 15 feet, neaps 10 feet.

BONWICK ISLAND, forming the western shore of Retreat passage, and the eastern shore of Arrow passage (the junction of these two channels taking place at its northern point), is 3 miles long (north and south), and 2 miles across, its highest part being about 770 feet. Off its south-west end, north of Sedge, Start, and High islands (*see* page 232), it is skirted by numerous small islets and rocks, between which, near the shore of Bonwick island, shelter may be found.

Dusky cove,* the anchorage above referred to, affords anchorage in 6 to 8 fathoms, about one cable eastward of Cove island, the largest of the islets. It is entered by a passage one cable wide between ledges of rock (which extend in patches half a mile W.S.W. from Cove island) and a chain of islets to the southward. Care must be observed, when entering, to avoid the reefs, which may be cleared by keeping the north point of the small Leading island at the head of the cove in line with the north extreme of South island, bearing E. by N. ½ N.

The westernmost of the reefs above mentioned (Evening rocks) covers at 6 feet rise, and Ledge rock, the outer of the islets on the south side of the channel, is only 3 feet above high water. Trap and South islands lie to the eastward of Ledge rock, the former being 25 feet high.

Fog islands are a small group lying off the shore of Bonwick island, on the south side of the entrance to Arrow passage. Evening rocks and the ledges extending W.S.W. from Cove island, lie half a mile southward of them.

* *See* plan of Dusky cove on Admiralty chart, No. 581; scale, $m = 2{\cdot}5$ inches. It is high water, full and change, in Dusky cove at 1h. 0m.; springs rise 13 feet.

Horse rock, awash at low water, is a dangerous rock lying off the north side of the entrance to Arrow passage, 8 cables W. ½ S. from the westernmost Fog island, and 3 cables S.S.E. from the Coach islands.

ARROW PASSAGE, between Bonwick island to the south-east, and Hudson and Mars islands on the north-west, is a clear navigable channel, in every part of which is deep water. Having passed the Horse rock, the passage may be boldly passed through in mid-channel, and a vessel may, if necessary, pass westward of the Fox islands, and rounding the northern islet of that group at 1½ cables, pass between it and Steep island (*see* page 233), and enter Cramer passage.

The Coach islands are a group of several small islands lying on the north side of the entrance to Arrow passage; they extend over a distance of three-quarters of a mile from the south-west end of Hudson island.

Hudson island, on the north side of Arrow passage, north-east of the Coach islands, is one mile long, and 3½ cables broad.

Mars island, 2¼ miles long, and three-quarters of a mile wide, lies close to, and north-eastward of Hudson island, on the north shore of Arrow passage. Spiller passage, between it and Hudson island, leads out to the north-west amongst the islets on the south-west side of Eden island, and into Trainer and Philips passages.

Shrub, Kate, and Triangle islands, with some other small islets, extend 1½ miles from the west end of Hudson island; Shrub island being the smaller and westernmost of the group.

SUNDAY HARBOUR.*—Between the above-mentioned islands and Crib island, to the north-west, a small but sheltered anchorage is formed, affording refuge for small vessels. The western entrance is between Shrub island and Huston island (a small islet lying 2 cables north of it) and is clear of danger. Half a mile in, the channel contracts to less than one cable in width between Narrows island and Island point, between which is a ridge with only 4½ fathoms on it, deepening again to 7 fathoms. There is a passage out to the eastward leading into Spiller passage.

Anchorage should be taken up in mid-channel as convenient, but at not more than 3 cables from the Narrows, in 5 fathoms, with Bush point bearing N. ½ E., and north point of Kate island shut in with Island point.

Tides.—It is high water, full and change, in Sunday harbour at 1 hr.; springs rise 13 feet.

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* *See* plan of Sunday harbour on Admiralty chart, No. 581; scale, $m = 2{\cdot}5$ inches.

Crib island, forming the north-west shore of Sunday harbour, is 1¼ miles long, and half a mile wide at its broadest part.

Eden island, forming the south-eastern shore of the entrance to Fife sound, is about 4 miles long (E.N.E. and W.S.W.), and 1½ miles broad, and has some smaller islands and rocks off its western end. Its south-west shore is a little more than half a mile northward of Crib island, and the passage between them is divided, by a group of islets lying in the centre, into two passages, that to the northward named Trainer, and that to the southward Philips passage.

Marsden islands are a group of five islets lying to the eastward of the two passages; southward of them, towards Spiller passage, are several other islets and rocks; but to the north-west and north of them (along the shore of Eden island) there is a clear channel to the north-east leading into Joe cove (Eden island) and Misty passage, and thence northward through Blunden and Old passages, on either side of Insect island, into Fife sound, south of the Benjamin group (*see* page 238). These passages are, however, very narrow, and shoal in places, and are not navigable except by small coasters.

Tracey island, 1½ miles long, and three-quarters of a mile wide in its broadest part, lies between the east ends of Eden and Mars islands. Between it and Eden island is Misty passage.

Monday anchorage.—Between Tracey island and Mars island is Monday anchorage, a sheltered position affording secure anchorage midway between the shores of the above islands in about 8 fathoms.

Baker island, forming part of the southern shore of Fife sound and the western side of Cramer passage, is situated eastward of Eden island, the triangular-shaped island named Insect lying between them. It is 1,385 feet high, 4¼ miles long E.N.E. and W.S.W., and 1¼ miles broad.

FIFE SOUND, bounded on the north by Broughton island, and on the south by Eden, Insect, and Baker islands, and the Benjamin group lying to the northward of them, and leading from Queen Charlotte sound to Sutlej and Tribune channels and Kingcome inlet, extends in a general N.E. and E.N.E. direction for 8 miles, when the Burdwood group divides it into two channels (Raleigh and Hornet passages) leading into Tribune channel; it has an average breadth of over one mile, and is a clear navigable channel, with deep water throughout. Fife sound, between Pearse peninsula and the Burdwood group, at 8 miles from its entrance, turns suddenly to the westward and joins Penphrase passage, which connects it with Sutlej channel and Kingcome inlet. The hills bordering on the shores of the sound vary from 600 to 1,500 feet in height.

The entrance from Queen Charlotte sound, between Duff island (south shore) and the entrance to Cullen harbour (north shore), may be boldly steered for, passing at about half a mile south-east of Gore rock (4 feet high), which lies about one mile westward of the entrance.

Fife sound may also be entered by Cramer passage, which communicates with Queen Charlotte sound by means of Retreat and Arrow passages on either side of Bonwick island.

Foster island, the summit of which forms a remarkable cone about 270 feet high, lies about 5 miles S.W. by S. from the entrance of Fife sound. Off its south side are the Twin islets (65 feet high), and off the north side is a patch of kelp, which may possibly overlie a rocky danger. The Twin islets lie 2¼ miles N.N.E. ¼ E. from Lizard point, the north-east entrance point of Trinity bay (Malcolm island). The channel between is called George passage, and is apparently free from danger.

Penfold island, covered with trees, 65 feet high, and small, lies 1½ miles eastward of Foster island; the channel between Foster and Penfold has not been examined.

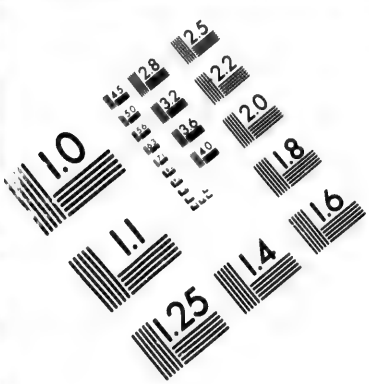
Holford islands, lying 2 miles N. by E. from Foster island, consist of two small islands, covered with trees, the tops of which are from 160 to 200 feet high. From the western island, a reef which uncovers 3 feet at low water, extends one-third of a mile to the westward, and the islands in this direction should be given a berth of one mile. The passage between Foster island and Holford islands, known as the Salmon channel, is clear of danger; a mid-channel course should, however, be kept.

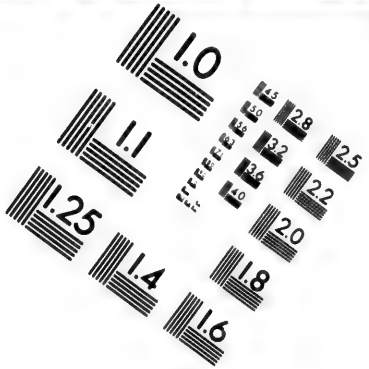
CULLEN HARBOUR,* on the south side of Broughton island, at the entrance to Fife sound, is formed between the shore of Broughton island to the eastward, and several islands lying off it to the westward, and extends about 7 cables in a N.N.W. direction. Its entrance between Nelly island and the shore westward of Gordon point is less than one cable wide, and, when entering, care should be taken to keep exactly in mid-channel. Inside the harbour opens out to 3 cables wide, with depths of from 4 to 8 fathoms.

At the head of the harbour, on the west side, a narrow boat passage, through which the tide runs with great strength, leads into Booker lagoon, an extensive sheet of water about 1¼ miles in extent, with depths varying from 12 to more than 45 fathoms. This lagoon has an outlet into Queen Charlotte sound to the westward of Long island, which forms the western side of Cullen harbour.

Anchorage may be had, well sheltered, in 5 fathoms, sandy bottom, at 1½ cables S. by E. from Davidson island at the head of the harbour.

* *See* plan of Cullen harbour on Admiralty chart, No. 571; scale, m = 6 inches.





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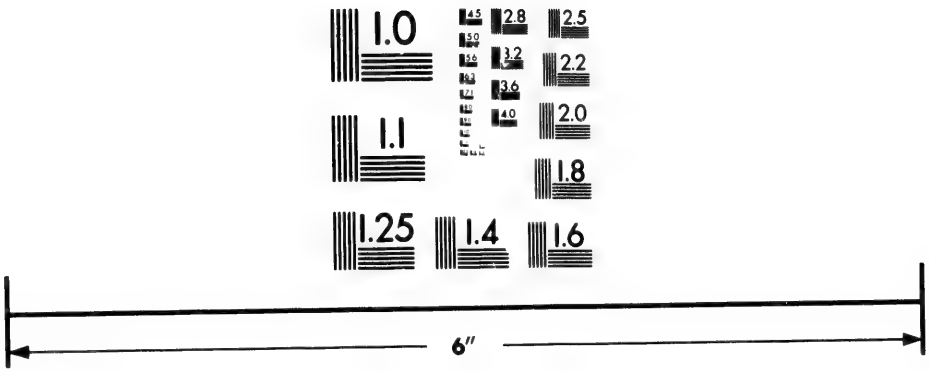

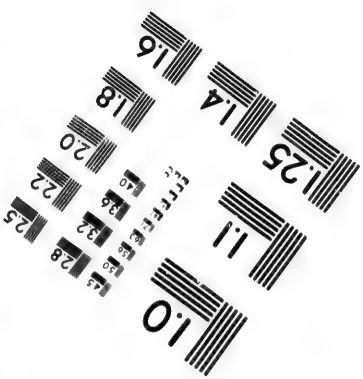

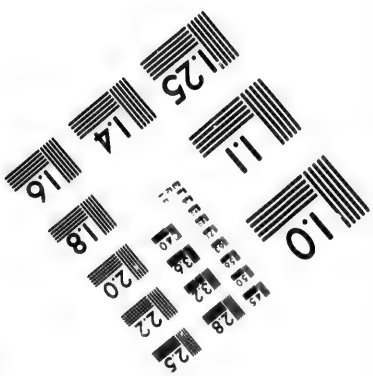

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Tides.—It is high water, full and change, in Cullen harbour at 12 hrs.; springs rise 16 feet, neaps 7 feet.

Deep harbour,* on the north side of Fife sound, 7 miles within the entrance, is formed by a narrow inlet, which indents the coast in an E.N.E. direction, forming on its south side Pearse peninsula. At its entrance is Jumper island, 2 cables eastward of which, and just north of two small islets, is a reef, leaving a clear passage in along the north shore 2 cables wide. The depths in the harbour vary from 14 to 37 fathoms; but anchorage may be found off a small bight on the south shore, in 18 fathoms, at 3 cables south-westward of the narrow entrance to the bight, which forms the head of the harbour.

Benjamin group, consisting of three islands and several smaller islets and rocks, lie off the south shore of Fife inlet, opposite Deep harbour. Indian passage, the narrow channel lying between them and the south shore, has a shoal patch of 1½ fathoms in it, and though otherwise apparently clear of danger, should not be attempted.

Rugged island, lying 1½ miles eastward of Gull rock (at eastern extreme of the Benjamin group), has a rocky patch extending 1½ cables from its north-west side.

Pym rock, which uncovers 2 feet at low water, and is steep-to, is a dangerous patch lying in the way of vessels entering Cramer passage.

Viner sound,† on the south-eastern shore of Fife sound, about 3 miles north-east of Rugged island, indents the coast in an E.N.E. direction for 3 miles, gradually narrowing from one mile at the entrance to 2 cables wide at the head, from which a bank, drying at low water, extends half a mile. Anchorage may be had in 10 fathoms at about three-quarters of a mile from its head, abreast an old Indian village.

Burdwood group, consisting of six large and several small islands, lies off the entrance to Viner sound. The largest, which is the north-western one, is 700 feet high. Vessels should not pass between them.

Simoom sound, the entrance to which is 1¼ miles N.W. from the Burdwood group between Deep Sea bluff on the east, and Pollard point on the west, extends 1½ miles N.N.E. and then turns suddenly to West, which direction it maintains for nearly 2 miles as far as Curtis point, where the width decreases from half a mile to 2 cables, and the inlet bends to the south-west, expanding to a width of half a mile at its head, which is only separated by a narrow neck of land from 120 to 150 feet wide from Shawl bay, an indentation on the east side of Sutlej channel, and forming Wishart peninsula. The width of Simoom sound at the entrance is one-third of a

* It is high water, full and change, in Deep harbour at noon; springs rise 16 feet, neaps 11½ feet.

† It is high water, full and change, in Viner sound at 1h. 0m.; springs rise 15 feet, neaps 10 feet.

mile, and on the eastern side, one mile from Deep Sea bluff, is the small islet of Louisa. The water is deep, but where the sound turns to the westward it shoals to 40 and gradually to 20 fathoms, and to the south-westward of Curtis point in O'Brien bay, decreases to 11 fathoms.

Raleigh passage, to the northward of the Burdwood group, connects Tribune channel with Fife sound and Sutlej channel; there is also a passage to the southward of the group called Hornet passage. There is deep water in both these passages, but the former is the wider and the more direct.

Directions for FIFE INLET.—Entering from Queen Charlotte sound, steer to give Foster island and the Holford islands a berth of at least one mile, and pass half a mile south-east of Gore rock, which at high-water spring tides is only 4 feet above water (*see* p. 237), whence steer boldly for the entrance, keeping as nearly as possible in mid-channel. Thence a course of N.E. by N. for 2 miles, and then N.E. by E. for 2 miles, will take a vessel to about mid-channel between Pemberton point and the western island of the Benjamin group, when haul to the eastward, steering in mid-channel about E. by N. ½ N. until the southern island of the Burdwood group opens out. From here the northern shore should be kept at about half a mile distant, gradually hauling to the northward, and passing between Nickless island (the small island at the east end of Pearse peninsula) and Village point, the west extreme of the southern Burdwood island. If bound through Sutlej channel, haul to the north-westward; if through Tribune channel, steer to round the north-west island of the Burdwood group at half a mile distant, and then to the eastward.

TRIBUNE CHANNEL, the entrance to which from Fife sound lies north-eastward of the Burdwood group, extends in a north-east direction for 10 miles; it then takes a south-easterly and easterly direction for 5 miles to the entrance of Thompson sound; thence it turns to the southward for 7 miles, communicating with Knight inlet (*see* page 227). Throughout the greater part it maintains an average width of one mile, but near Kwatsi bay, where the channel turns to the south-east, and again at 2 miles within its southern entrance, it narrows to half a mile in width. The water is deep throughout, the only danger being Humphrey rock, on which is a depth of 3 fathoms, lying in mid-channel just south of the southern narrows above referred to. Tribune channel has the same characteristics as most of the other deep inlets on this coast.

Kwatsi bay, on the north shore of Tribune channel, about 8 miles eastward of the Burdwood group, indents the coasts for about 2 miles in a northerly direction. The water in the southern part is very deep, but

shoals at half a mile from the head of the bay to 28 fathoms, and gradually to 13 fathoms.

Wah ka na bay, on the south shore of Tribune channel, opposite to Kwatsi bay, indents the shore of Gilford island in a south-westerly direction for nearly 2 miles, varying from 2 to 4 cables in width; the depth at about one mile within the entrance being 32 fathoms, and near the head 18 fathoms.

Bond sound, which indents the north shore of Tribune channel, extends 3 miles in a northerly direction, and has an average width of nearly one mile; Bond sound, owing to the great depth of water in it, affords no anchorage, there being 30 fathoms close alongside the mud bank at its head, through which some streams enter the sound.

Thompson sound, 6 miles south-eastward of Bond sound, extends in a north-east direction for 5 miles, its entrance being on the east shore opposite Trafford point, where Tribune channel turns to the southward. At the head of the sound is Sackville island, and the Kakweiken river flows into the sound northward of it. Between Sackville island and the mud flat off the river, the depths shoal, but rather steeply; anchorage, however, might with ease be picked up in the north-east corner, in 12 fathoms.

Humphrey rock, with 3 fathoms water on it, lies nearly in the centre of the southern part of Tribune channel, abreast Bamber point, the west salient point of Viscount island, and 2 miles to the northward of the north-east point of Shewell island.

Gilford island, the largest of the islands forming the archipelago on the eastern shore of Queen Charlotte sound, is 18½ miles long in a north-east and south-west direction, and 11 miles wide at its north-east end, gradually decreasing to 2 miles near its south-west extreme (Bare hill). It is bounded on the south by Knight inlet, its eastern and northern sides being embraced by Tribune channel, whilst numerous small islands lie off its west shore, and from which it is separated by Spring, Retreat, and Cramer passages. The west side of the island is much indented, and some of the bights thus formed afford anchorage, amongst which are Health bay and Shoal harbour. Gilford island is considerably elevated, the highest parts being near the north-east end, where mount Read rises to a height of 4,820 feet; mount James, near the centre, is 2,676 feet high. The south-west part of the island, however, is not so lofty, the hills over Bare hill point not being more than 925 feet high; but round its eastern, southern, and northern shores mountains ranging from 2,600 to 1,500 feet high rise almost precipitously from the water's edge.

BROUGHTON ISLAND, which forms the north-west shore of Fife sound, and the southern and western shore of Sutlej channel, is 15 miles long in an east and west direction, and 6 miles wide at its western end, gradually tapering to one mile wide at its eastern extreme (Pearse peninsula). The island is much indented, the largest inlet, Greenway sound, nearly separating the island into two parts; and a canoe passage also leads from Greenway sound to Carter bay, at the west point of the island, thus detaching the northern part of Broughton island, which is, therefore, really another island. The hills on Broughton island are not so lofty as those of the mainland contiguous to it, the highest peaks being mount Browne, 1,745 feet, on the north shore of Greenway sound, and Quoin or Stoney mountain, 1,500 feet high over the entrance to Deep harbour; the remaining hill ranges varying from 600 to 1,000 feet in height.

From the entrance to Cullen harbour, the south shore of Broughton island trends to the westward for about 8 miles to the entrance to Wells pass; it is steep-to, and clear of danger at half a mile distant. Dobbin bay and Cockatrice bay afford no anchorage.

Polkinghorne islands, a group consisting of one large and several smaller islets and rocks, lie off the coast at the entrance to Wells pass; the largest island, 190 feet high, being over one mile in length in a N.W. and S.E. direction, but only about 2 cables wide, and is distant from Broughton island 1½ miles. Foul ground extends for some distance from the east side of this group, and it should not be approached within a distance of half a mile.

Vincent island, 200 feet high, lies half a mile north of the west extreme of the largest of the Polkinghorne islands, some smaller islands lying between them.

Percy island, 330 feet high, lies one-quarter of a mile north-west of Vincent island, and has several islets and rocks skirting its north-west shore and bordering on Wells pass.

Dickson island, at the western extreme of Broughton island, half a mile north-east of Percy island, forms the south shore of Carter bay; it is 340 feet high, and its southern shore is skirted by islets and rocks, some of which extend across to Percy island.

Caution.—Vessels passing between the Polkinghorne islands, Vincent, and Percy islands, should do so with great caution, and should not attempt to pass between the latter island and Dickson island.

Carter bay is formed between Dickson island and Broughton island, on the east shore of Wells pass; the water in it is deep. From its eastern corner a canoe passage leads into Greenway sound.

WELLS PASS, the entrance to Sutlej channel from Queen Charlotte sound, lies between the islands above-mentioned and the south-eastern shore of the large peninsula which forms the southern shore of Drury inlet. From the entrance between Boyles point and Percy island, the pass extends 5 miles in a N.N.E. direction to its junction with Patrick passage, Grappler sound, and Drury inlet. The width at the southern part, between Dickson island and Popplewell point, is only half a mile, widening gradually to one mile at the northern end.

The eastern shore of Wells pass is bordered by hills 900 feet high; the western shore at the outer part is not quite so lofty, the height of the hills being between 300 and 500 feet, but culminating, however, near Compton point (the north-west point of the pass), in mount Otway, 1,215 feet high. The eastern shore is much broken by bays, including Tracey harbour, but the west shore is straight and compact.

Ommaney islet, about 120 feet high, is the westernmost of the islets lying in Wells pass between Percy and Dickson islands; its south and south-east sides are surrounded by kelp to a distance of about 2 cables, amongst which are rocks drying at low water. The passage into Wells pass is to the westward of Ommaney islet, which narrows the navigable channel to a width of 4 cables. Vessels entering Wells pass should, when approaching Ommaney islet, keep the highest peak of Numas islands (lying off the entrance) just open of Boyles point until Ommaney islet is well shut in under Dickson island; whence steer to pass in mid-channel between the islet and James point, and hence keep the western shore on board.

SUTLEJ CHANNEL from its entrance (Wells pass) takes a N.N.E. direction for nearly 5 miles, varying from three-quarters to one mile in breadth, and is clear of danger. At that distance it turns to the eastward through Patrick passage between Atkinson and Kinnaird islands, and thence south-eastward for 6 miles to the entrance to Greenway sound, whence it takes a general E.S.E. direction through Pasley and Sharp passages (on either side of the Stackhouse island), to its junction with Penphrase passage (*see* page 245) and Kingcome inlet. It is a clear, deep channel throughout, and there is no impediment to safe navigation by maintaining a mid-channel course.

TRACEY HARBOUR,* on the eastern shore of Sutlej channel (Broughton island), nearly 3 miles within Wells pass, is at its entrance between Lambert island (on the north) and Mauve islet, 4 cables wide, but it soon narrows from 2½ to 1½ cables, maintaining that width for a little over one mile in an east direction; the harbour then opens out and forms two bights at its head, Napier bay, the northern, being 2½ cables broad.

* *See* plan of Tracey harbour on Admiralty chart, No. 571; scale, $m = 6{\cdot}0$ inches.

The only danger is the reef skirting Star rock (which lies on the north shore about half-way through the narrow portion of the harbour), and vessels entering should keep the southern shore on board at half a cable distance.

Anchorage, completely sheltered, may be obtained in from 6 to 7 fathoms in Napier bay, or abreast Freshwater cove, at about 2 cables E.S.E. of the Star rock, in 10 fathoms, mud bottom.

Tides.—It is high water, full and change, in Tracey harbour at 12 hrs.; springs rise 16 feet, neaps rise 11½ feet.

Lambert island, on the north side of the entrance to Tracey harbour, is 2½ cables long, and 2 cables wide and 350 feet high; immediately to the eastward of it is Wolf cove, extending 4 cables in a north-easterly direction with a width of 2 cables at the entrance, gradually narrowing to one cable; it, however, affords no anchorage.

Atkinson island, 715 feet high, lies close off the north-west shore of Broughton island, at 2 miles northward of the entrance to Tracey harbour; some islets extend off its south-west point, and vessels should not attempt to pass between it and the shore of Broughton island.

Surgeon islands, a group of small islets close together, lie half a mile west of Atkinson island at the entrance to Patrick passage.

Kinnaird island, 680 feet high and 1¼ miles long, lies on the east side of Grappler sound, with Dunsany passage on the east and Patrick passage on the south.

Greenway sound, on the south shore of Sutlej channel, 5 miles eastward of Patrick passage, is a deep inlet nearly one mile wide at its entrance, extending 6 miles in a westerly and southerly direction, and gradually narrowing towards its head, which approaches within one-quarter of a mile of the head of Dobbin bay (*see* page 241). It has deep water throughout its entire extent, and affords no anchorage; inside its entrance are Cecil and Maude islets, 180 and 150 feet high.

CYPRESS HARBOUR,* in Sharp passage, 2½ miles eastward of the entrance to Greenway sound, indents the coast about one mile in a southerly direction; the upper half, however, is both narrow and shallow, and the anchorage is limited to only a small portion of the remainder, owing to the depth of water being too great. The entrance between Donald head (on the east side) and Woods point is 2 cables wide, but the navigable channel is only a little over one cable wide; the harbour then

* *See* plan of Cypress harbour on Admiralty chart, No. 571; scale, $m = 6{\cdot}0$ inches.

opens, and is from 2 to 4 cables across, the depths varying from 19 fathoms in mid-channel to 6 fathoms abreast Berry cove.

Fox rock, 16 feet above low water, lies in the entrance, and is the outer part of a reef which extends one cable east from Woods point. Vessels entering the harbour should, to avoid it, keep Donald head on board at half a cable distant.

Anchorage.—Good anchorage may be obtained on the west side 4 cables from Woods point in 6 fathoms, mud bottom, off Berry cove, at one cable N.E. by N. from Tree islet. The land to the southward of the anchorage, between the head of Berry cove and Roffey point, is fringed with large cypress trees.

Water.—A stream of fresh water flows into Berry cove.

Tides.—It is high water, full and change, in Cypress harbour at 12h. 0m.; springs rise 16 feet, neaps 11½ feet.

Stackhouse island, 690 feet high, is about half a mile in extent and lies in the middle of Sutlej channel abreast the entrance to Cypress harbour. Sharp passage to the southward of it, and Pasley passage to the northward, are both half a mile wide.

Magin islands, three small islands from 120 to 180 feet high, lie one mile to the northward of Stackhouse island, and half a mile from the west shore, a small rock, awash at high water, lying between.

Tides.—The tides in Sutlej channel run at the rate of from one to 3 knots.

KINGCOME INLET, at its entrance is 2 miles wide, but the navigable channel between the Magin islands (lying off the west shore) and Bradley point (the west point of Gregory island) is contracted to 1¼ miles in width. Thence the inlet takes a N.E. by N. direction for 6 miles to the entrance to Wakeman sound (on the north shore), whence it trends E. by N. ½ N. for a further distance of 12 miles to its head, maintaining an average width of one mile. Its termination on the northern shore is a low marshy plain dotted with patches of scrub and stunted trees, and bordered by a flat of soft mud and sand 1¼ miles wide, which extends half a mile from the shore. This flat is steep-to.

The northern shores of this inlet are bordered by snow-clad peaks of 5,000 to 6,000 feet in height, which are conspicuous from Queen Charlotte sound; the southern shore is not quite so lofty, the range varying from 3,000 to 4,000 feet. Kingcome mountains, 5,600 feet high, rise over the head of this inlet, being 2 miles inland in an easterly direction.

Anchorage.—Kingcome inlet, in regard to the great depth of water, presents the same features as most of the chasm-like fiords on

this coast. Anchorage, however, may be obtained in 18 fathoms, off a small cove, near two small bights, at 1½ miles S.S.E. of the head of the inlet.

Wakeman sound, on the northern shore of Kingcome inlet, branches off to the N.N.W. at 6 miles from the entrance, in which direction it extends for a distance of 5 miles, terminating in a low marshy plain dotted with patches of scrub and stunted trees, through which several streams flow, bringing down from the high ranges inland the melting snow, and causing the water for one mile from the head of the sound to be perfectly fresh at low water, and of a dull milky colour. At its head is an Indian village. The water is too deep for anchorage.

Belleisle sound, on the south shore of Kingcome inlet, at 3 miles E.S.E. from the entrance to Wakeman sound, has its entrance through a narrow pass which lies south of the small Edmond islands. The inlet takes a S.E. direction for about one mile, and then suddenly turns to the S.W. for a further distance of 3 miles; it, however, from its great depth of water, affords no anchorage.

Penphrase passage, connecting Sutlej channel and Kingcome inlet with Fife sound and Tribune channel, is about 2¼ miles long in an E. by N., and W. by S. direction between Broughton and Trivett islands on the south and Wishart peninsula on the north. The west entrance between Hayes and Vigis points is one mile wide, but the width of the passage decreases to 2½ cables abreast of Trivett island. About one cable east from Trivett island is a shoal patch of 3 fathoms; with this exception the passage appears to be clear from dangers, and this may be avoided by keeping the shore of Wishart peninsula on board. Nicholls island lies just inside the west entrance on the south side of the channel, its east extremity being nearly three-quarters of a mile E. by S. from Hayes point.

A rock awash at low water lies 1¼ cables to the westward of the west point of Nicholls island, and 3 cables S.E. by E. from Hayes point, but being inside a line joining the point with the east end of the island, is out of the fairway of the channel.

DRURY INLET.—Between Pandora head (*see* p. 247) and the shore to the southward, is the entrance to Drury inlet, which is here only one cable wide, with a depth of 15 fathoms in it; just outside (eastward) the entrance is Morris island, which should be passed on the north side, and the northern shore should be closed to avoid a reef (marked by kelp in the season) lying on the south shore, half-way between Morris island and the narrowest part of the entrance channel. Drury inlet extends in a W. by S. direction for 12 miles to its head, where another narrower arm (Actæon sound) branches off on the north shore for a distance of 4 miles to the north-eastward.

Over the greater part of Drury inlet the depth is less than 25 fathoms, and it is nowhere so deep as most of these inland channels; in width it varies from one cable to one mile, the latter being its width throughout the greater part of the inlet; but at one place, Stuart narrows, 1¼ miles within the entrance, two islets (each connected to the shore by reefs) leave a passage of only 1½ cables between them, and this is further obstructed by a dangerous rock, which only uncovers at low water (5 feet), lying directly in the fairway between the two islets. Through these narrows the tidal streams during springs attain a velocity of 5 knots an hour.

Passing up Drury inlet, the shores of which have an average height of less than 1,000 feet, at one mile from Stuart narrows, Leche island is seen lying in mid-channel, and may be passed on either side; here the inlet opens out to the southward, forming Richmond bay, in which are several islets. At a little over one mile westward of Leche island is Ligar island, 150 feet high, having at one cable east of its south point a dangerous sunken rock, uncovering only 5 feet at low-water springs.

Voak rock, another dangerous rock, awash only at low-water spring tides, lies 3 cables N.N.W. ½ W. from Ligar island, with deep water between.

Sir Everard islands, on the south shore, 1½ miles westward of Ligar island, form a chain extending in a N.W. direction, with rocks between them, a clear channel lying between them and Hooper island to the northward.

Blount rock, 3 feet above high water, lies close to the south shore half a mile to the westward of Sir Everard islands.

Jennis bay, on the north shore, abreast the Sir Everard islands, would afford anchorage for a small vessel, which, when entering, should pass eastward of Hooper island lying at the entrance, and anchor in the centre of the bay in 7 to 10 fathoms.

Centre rock, a dangerous sunken rock, uncovering only 8 feet at low-water spring tides, lies in the middle of Drury inlet $1\frac{1}{10}$ miles West of the northern of the Sir Everard islands; it is steep-to all round, and vessels will clear it by keeping at 2 cables from either shore.

Muirhead islands.—At 2¼ miles westward of Centre rock, the inlet becomes studded with small islands, having deep channels between them, and extending over a distance of 2 miles. The easternmost of these is Wilson island, 120 feet high; Keith island, also 120 feet high, lies 2 cables to the westward of it, and the Muirhead islands, three in number, extending one mile in an east and west direction, are situated one cable westward of the latter. The west Muirhead island is the largest and 255 feet high, the next in size, the eastern, being 180 feet high. Between this group

and the south shore the space is occupied by numerous small islands, but there is a clear channel along the north side of the group; westward of these, however, the water shoals rapidly, there being only 2 to 3 fathoms in Sutherland bay at the head of Drury inlet. A densely wooded valley extends across the peninsula in a south-west direction to the outer coast of Queen Charlotte sound.

ACTÆON SOUND, which branches off from the north side of Drury inlet abreast the west Muirhead island, is so blocked at its entrance by islets and rocks as to render it only available to boats. At 1½ miles up it is again obstructed by rocks, and thence (from Bond peninsula) the inlet becomes very narrow (less than half a cable wide), but opens out farther up into two bays, Hand bay (on the south) and Creasy bay, after which it becomes a mere gorge terminating in overfalls at its head, probably from some backwater which fills on the flood tide. The Silverlock hills (1,900 feet) rise over the north side of the head of Actæon sound.

GRAPPLER SOUND.—West of Patrick passage (*see* page 242), between Kinnaird island and Pandora head (a small peninsula of the mainland) is the entrance to another inlet which continues in a northerly direction for four miles and is known as Grappler sound. From it several smaller bights branch off on both sides, those on the east communicating with Hopetown and Kenneth passages, north and south of Watson island. The depths in the sound range from 20 to 30 fathoms, but are shoaler in Claydon and Carriden bays on the west shore. At the entrance to the former a reef lies nearly in mid-channel, and a reef also extends 1½ cables from Linlithgow point, on the north shore of the entrance to the latter.

Buckingham, Hammersley, and Hanbury islands lie on the north side of Kinnaird island at the entrance to Hopetown passage, the first being the largest and 300 feet high.

Dunsany passage, leading from Grappler sound to the entrance to Hopetown passage and south-eastward into Sutlej channel, east of Kinnaird island, is apparently clear of danges, with the exception of a reef, which covers at high water springs, lying off the north shore at the entrance to Hopetown passage.

Hopetown passage can only be used by boats, which can pass the barrier of rocks (that extend right across the passage at 1¾ miles from the entrance) at high water, and can thence proceed into Mackenzie sound.

Kenneth passage, leading from the head of Grappler sound round the north side of Watson island, is 3½ miles long and communicates with Mackenzie sound at its junction with Hopetown passage. About one mile

from its entrance (which is only a little over one cable broad) from Grappler sound it widens considerably, a bight, named Turnbull cove, extending one mile in a W.N.W. direction; but half a mile further eastward the passage contracts to 3 cables between Alexander and Tessie points, and thence several islands, islets and rocks obstruct the passage, rendering its navigation dangerous.

MACKENZIE SOUND, from the east point of Watson island, extends 3 miles in an E.N.E. direction, gradually narrowing towards its head at the foot of mount Stephens (5,665 feet high), where it becomes a mere chasm, and shoaling in the same direction from 25 to 10 fathoms.

"This chasm in the mountains, caused probably by some violent effort of nature, differed materially in one particular from all the canals we had hitherto examined, namely, in its having regular soundings, although its shores, like all those of the bottomless canals, were formed by perpendicular cliffs from their snowy summits to the water's edge. The stupendous mountains on each side of the narrow chasm prevented a due circulation of air below, by excluding the rays of the sun, whilst the exhalations from the surface of the water and the humid shores of the canal, wanting rarefaction, were, in a great measure, detained like steam, in a condensed state; the evaporation thus produced a degree of cold and chilliness which rendered our night's lodging very unpleasant."*

BOYLES POINT, the western entrance point of Wells pass and the southern point of the peninsula formed by Drury inlet, has three small islets lying close off it, the outer of which is only 4 feet above high water. Over and on each side of the point are undulating hills of about 500 feet high, rising gradually inland to mount Wynyard (about 1,200 feet high).

Boyles point is situated in latitude 50° 48′ 40″ N., longitude 127° 1′ 40″ W.

Lewis rocks, a small cluster, 30 to 4 feet above high water, lie one mile W.S.W. from Boyles point, with rocks awash and foul ground extending 7 cables southward from them.

Numas islands, the largest of which is 1½ miles long in an east and west direction, lie in Queen Charlotte sound, off the entrance to Wells pass, 4 miles S.S.W. from Boyles point; the largest is 434 feet high, and off its western extreme is Staples islet, 24 feet high. These form an excellent landmark.

Labouchere channel, between Numas islands and the Lewis rocks, is over 2 miles wide, with no bottom at 80 fathoms in mid-channel. The tidal streams run at the rate of from one to 3 knots through this channel.

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* *Vancouver's Voyages, Vol. I., p.* 360.

The COAST of the mainland from Boyles point trends nearly due west for 20 miles, and between that point and the Rayner group, a distance of 8 miles, is steep-to.

Rayner group consists of four or five small islands, 120 to 150 feet high, lying close to the shore eastward of Blunden harbour. The southern edge of the group is fringed with sunken rocks, and they should not be approached in that direction nearer than half a mile. Masses of kelp surround these islands in the season, and skirt the shore towards Blunden harbour.

Gillot rock, 2 feet above high water, is the easternmost of the dangers lying to the southward of the Rayner group.

Black rock, only 7 feet above high-water spring tides, is the westernmost of the dangers in the vicinity of Rayner group.

BLUNDEN HARBOUR,* on the north shore of Queen Charlotte sound, 12 miles westward of Wells pass and a little more than one mile from Black rock, is formed between several islands which lie close off an indentation in the coast. The entrance between Shelf point, the east extreme of Robinson island (120 feet high), and Barren rock, a small rock 12 feet high, is 2½ cables wide; but a reef (marked by kelp) extends 1¾ cables South from the latter, and another reef extends the same distance E.N.E. from Burgess island (100 feet high), a small island lying close to the shore 3½ cables S.S.W. from Shelf point, thus rendering the channel somewhat tortuous.

Inside the harbour, amongst the small islands in its northern part, the depths are shoal and covered with kelp.

Anchorage may be obtained in 4 fathoms, mud bottom, in the western part of the harbour, at 2 cables S.W. of the southern of the two Bonwick islands, which are joined to the shore and to each other at low water.

Directions.—Vessels entering Blunden harbour, which is only available for vessels of moderate size, should bring Shelf point to bear N.W. ¾ N., when it will be just open of Charles point (on the east shore), and steer in on these marks until Barren rock bears N.E., when haul to the northward to pass midway between the rock and Shelf point. When the channel opens, haul to the westward, keeping in mid-channel and steering W. ¾ N. with Barren rock astern, until the passage between the southern Bonwick island and Bartlett point bears S.W. by W. ½ W., when alter course in that direction. As the channel here is only half a cable wide, very great caution must be observed.

Tides.—It is high water, full and change, in Blunden harbour at 12 hrs.; springs rise 16 feet, neaps rise 11½ feet.

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* *See* plan of Blunden harbour on Admiralty chart, No. 571; scale, $m = 6$ inches.

Browning islands, 2½ miles W.S.W. from the entrance to Blunden harbour, are a small group, the largest being 2½ cables long and about 200 feet high. A dangerous rock, which dries only 3 feet at low-water spring tides, lies 3 cables E.S.E. from the east extreme of the largest of the Browning islands, and vessels should therefore give those islands a berth of from one-half to one mile when passing.

Stuart point, 1¾ miles W. by N. from the Browning islands, has some rocky islets off it; and 3 cables E. ½ S. from Stuart point, in the centre of a bay between the point and Browning islands, is a patch of 2 fathoms.

Leading hill, 570 feet high, is situated close over the coast 1½ miles W. by N. ½ N. from Stuart point.

Robertson and Jeanette islands, the latter 100 feet high, lie close off the shore under Leading hill.

Round island, a little over half a cable in extent, the tops of the trees being 100 feet above the water, lies 6 cables S by W. from Jeanette island; the channel between is clear, there being depths of over 40 fathoms in it.

The Millar group consists of a chain of small islands extending over a distance of 2 miles in a W. by N. ½ N. and E. by S. ½ S. direction at 4 cables southward of Round island, between which and the group vessels should not pass. The tops of the trees on the highest island of the group are from 150 to 200 feet above the sea. At 3 cables W. by N. ½ N. from the western island of the group is David rock with 12 feet water on it.

Mary rock, a dangerous rock lying 8 cables S.E. by E. ½ E. from the south end of the Millar group, is, however, generally visible, it being awash at high water. Vessels passing through the North channel from the south-eastward should approach it with Round island bearing W. by N., and not bring the island to bear northward of that bearing until the east end of the Millar group bears W.S.W., when alter course for mid-channel between Round island and Jeanette island.

The Deserters islands are a group of islands, islets and rocks, the largest of which is nearly 2 miles in length, lying 1¾ miles southward of the Millar group. The Walker group (*see* page 264) is situated to the westward of the Deserters, separated from them by Shelter pass.

RIPPLE PASSAGE, between the Millar group and the Deserters islands, has several dangerous rocks in it, and should therefore not be used except in an emergency, and then only at low water (when nearly all the dangers show) and with the greatest caution.

Sun rock, the most dangerous of these rocks, owing to its locality only being known during bad weather, when the sea breaks on it, lies 8 cables S.W. ½ W. from the westernmost islet of the Millar group.

Twin rocks, 10 feet above high water, are two small rocks lying 6 cables north-east of McLeod island. Heavy overfalls are met with northward and westward of the Twins.

Richard islet, 25 feet above high water, and bare, lies 7 cables N.E. from the Twins; it should not be approached within one cable's length.

Barry islet lies one mile S.E. by E. ¼ E. from Richard islet; it is bare, and 45 feet above high water.

Echo islets, a small group lying 8 cables south of Barry islet, extend over half a mile in a N.W. and S.E. direction. At 3 cables off their north-west end is the George reef; it lies three-quarters of a mile S.W. from Barry islet.

The NORTH CHANNEL* into Queen Charlotte sound extends close along the shore of the mainland from Bremner island off Buccleuch point to between Jeanette island and the Millar group (above described), passing between White and Mayor islands on the north, and North rock on the south (*see* page 266), and at half a mile southward of Rogers, Dickenson, and Harris islets; thence past Bold bluff, and midway between Wentworth rock and Wallace islands. To clear the North rock, passing northward of it, keep Harris islet just open south of the south extreme of Jeanette island bearing E. by S. ½ S.

Wallace islands lie close to the shore of the mainland at 3 miles westward of Robertson islands and at the entrance to Shelter bay; they are steep-to at one-quarter of a mile from their southern shore.

Shelter bay indents the coast in an easterly direction for nearly 2 miles, forming two bights at its head. The entrance between the Wallace islands and the shore to the northward is 4 cables wide, but the bay is encumbered with rocks in its most sheltered part, and could only be made use of as an anchorage by those possessing local knowledge. In a small bay north of Wallace islands there is good landing for boats, and there is also good landing for boats, in south-easterly winds, in a bight 3 cables west of the point forming the north-west entrance to Shelter bay.

Wentworth rock, 10 feet above high water, lies 1½ miles S.W. ¾ W. from the Wallace islands; it should be given a berth of half a mile in all directions.

Annie rocks, 16 feet above high water, are bare rocks, lying at 3 cables off the coast 1¼ miles west of the entrance to Shelter bay.

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* *See* Admiralty charts:—Goletas channel to Quatsino sound, No. 582; scale, $m = 0{\cdot}5$ of an inch: also Vancouver island, No. 1917; scale, $m = 0{\cdot}15$ of an inch.

Southgate group, consisting of four larger and several smaller islets, lie close off the coast 3 miles westward of Shelter bay. Bold bluff, the south-east island of the group, has rocky patches off its east end. The shore of the mainland abreast Bold bluff falls back to the N.N.W. for a distance of 6 miles, the southern part being skirted by several small off-lying islets and rocks.

Harris islet, 30 feet above high water, is a small bare islet lying one mile westward of the Southgate group.

Dickenson islet, 16 feet above high water, is a small bare islet 7 cables W. by N. ¼ N. from Harris islet.

Rogers islet, a similar small bare islet, 40 feet high, lies 6 cables N.W. ½ W. from Dickenson islet. Foul ground extends for 2 cables from its north and south ends.

Elizabeth rocks are a small patch lying 3 cables north-west of the Southgate group.

Emily group, consisting of four small islets, the tops of the trees on which are 90 feet above the sea, lie a mile northward of Rogers islet.

Eliza island, 3 cables in extent, lies 3 cables north of the Emily group; the tops of the trees on the island are about 240 feet above the sea, and there are some conspicuous white cliffs on its south side.

Frederick islet is a small islet 90 feet high, lying half a mile eastward of Eliza island. From Frederick islet, towards Elizabeth rock, there are several rocky patches.

Murray labyrinth is the name given to the many channels which lie between a group of several islands, islets, and rocks lying off the south coast of Branham island 2 miles N.N.W. from the Southgate group.

Branham island, 3½ miles long (east and west) and 2½ miles broad, lies off the coast of the mainland, and together with the Fox islands forms the southern shore of Slingsby channel. Nina hill, on the south side of the island, is 500 feet high. Skull cove, indenting the island to the eastward of Nina hill, affords good shelter for boats.

Schooner passage, between the east shore of Branham island and the mainland, is a narrow pass having an average width of one cable in a N.W. direction for a distance of 2½ miles; it is, however, at one place obstructed by a rock lying in mid-channel, which leaves a passage only 80 yards wide between it and the shore of Branham island. Schooner passage communicates with Slingsby channel, at one mile southward of the Nak wak to rapids.

The tides in Schooner passage run at rate of from 2 to 5 knots.

Mayor island, a small wooded island, 1½ cables in extent, and 90 feet high, lies 1$\frac{2}{10}$ miles W.N.W. from the Emily group. A rock awash at low water lies 2 cables East from it.

White island, small, bare, and 48 feet high, lies 1½ miles W. by N. ¼ N. from Mayor island.

Morphy rock, which covers at three-quarters flood, lies 6 cables N.E. by E. ½ E. from White island, and 3½ cables S. by W. ¼ W. from McEwan point, the south-west extreme of Branham island.

Fox islands, the western of which, 375 feet high, is 1½ miles long (north-east and south-west), and the eastern half a mile long, lie off the western end of Branham island, and form the south shore of the outer part of Slingsby channel.

SLINGSBY CHANNEL,* on the northern shore of Queen Charlotte sound, 7 miles south-eastward of cape Caution, leading to Seymour and Belize inlets, is 5 miles in length in a N.E. by E. ½ E. direction, with an average breadth of 3 cables, between Outer narrows and Nak wak to rapids.

Outer narrows.—At three-quarters of a mile within the entrance (between Dalkeith and Lascelles points) the channel contracts to only one cable in width, with no bottom at 40 fathoms. In these narrows the flood tide runs 2½ hours after high water by the shore; at springs the velocity is from 5 to 9 knots, at neaps from 4 to 6 knots, the change of stream occurring after only about 15 minutes slack water. The ebb tide runs 2½ hours after low water by the shore, attaining, at springs, a velocity of 10 knots, and at neaps from 5 to 7 knots. With the wind blowing in, *i.e.*, between West and South, the sea breaks across the entrance, and in the narrowest part, even during calms, the water is much agitated.

Nak wak to rapids (Kah tsis illa), at the eastern end of Slingsby channel (communicating with Seymour inlet), are two cables wide, but in the centre of the rapids is Turret island, 80 feet high, against which the tide rushes with great fury. The channel westward of Turret islet has a rock in it with only 2 fathoms water on it; that to the eastward has depths of from 6 to 11 fathoms.

The flood tide commences 2½ hours after low water by the shore in Slingsby channel, and runs (with a velocity at springs of 12 to 15 knots) from 2 to 2¾ hours after high water, or until it is high water at Seymour inlet; after an interval of 10 minutes slack water the ebb commences and runs until 2 to 3 hours after low water in Slingsby channel, attended by very heavy and dangerous overfalls, and attaining a velocity at springs of 20 knots.

* It is high water, full and change, in Slingsby channel at 2h. 20m.; springs rise 11 feet, neaps 5 feet.

Directions.—Steam vessels may enter Slingsby channel from the westward through the Outer narrows in fine weather, at or near slack water, and proceed to Treadwell bay, 4 miles within the entrance on the north shore, where anchorage will be found in from 9 to 15 fathoms, avoiding the shoal of 2½ fathoms situated southwards of the centre of the bay.

If it be necessary to proceed through Nak wak to rapids, the turn of the tide should be most carefully watched, so that the vessel may with certainty make the passage during the only 10 minutes of slack water, for at no other time would it be possible to do so with any degree of safety.

These narrows, however, should only be used by a vessel on emergency and after acquiring some practical knowledge, by passing through at slack water in a boat. It is also imperative that the tides should be previously watched from Treadwell bay.

Small canoes pass from Slingsby channel into Seymour inlet at half tide through a very narrow passage on the north shore inside the small island forming the north point of the narrows.

Treadwell bay,* on the north shore of Slingsby channel, is formed by the channel widening to 8½ cables and forming a bight in which lie the Anchor islands (a group consisting of one large and several small islands) leaving a sheltered space 2½ cables in extent between the north shore of the large island and the shore. The largest Anchor island is half a mile long east and west, and 220 feet high. The depth of water in the bay varies from 7 to 12 fathoms, but near the centre, rather over to the south side, there is a shoal spot with from 4 to 2½ fathoms on it. The bay affords shelter perfectly free from tide for vessels of any size. Large ships should moor.

Caution rock, which uncovers (6 feet) only at low-water spring tides, is a dangerous rock lying in the fairway channel south-eastward of the Anchor islands, and 1½ cables from the south shore of Slingsby channel. To avoid it, keep the south shore on board at less than one cable's length.

Directions.—Entering Treadwell bay, give the south-eastern Anchor islands (Current point) a berth of 1½ cables, and having rounded them, keep the shore of the mainland on board.

Anchorage.—Anchor as convenient in 10 to 12 fathoms northward of the 2½-fathoms patch.

Schooner passage.—One mile southward of the Nak wak to rapids is the north entrance to Schooner passage (*see* page 252), which

* **Tide.**—It is high water, full and change, in Treadwell bay at 0h. 30m.; springs rise 11 feet, neaps 5 feet.

may be approached on either side of Buttress island (210 feet high), which lies on the south shore of Slingsby channel, fronting the passage.

NUGENT SOUND.*—From the Nak wak to rapids a branch half a mile wide takes an E.S.E. direction for about one mile; here it divides into two, one branch continuing in an E.S.E. direction, and the other (Nugent sound) an E.N.E. direction for 11 miles. Nugent sound in some places is only 2 cables across, but it has deep water throughout, and is navigable, though there is no anchorage in it. A very narrow passage leads from the head of Nugent sound into a sheet of water taking an easterly direction for three-quarters of a mile, from which there is communication overland by Schwartzenberg gorge with Seymour inlet.

SEYMOUR INLET.—The other branch, from Margaret point at the entrance to Nugent sound, takes an E.S.E. direction for 6 miles, with deep water in mid-channel. On the north shore is Charlotte bay, and on the south Ellis bay, both, however, unavailable as an anchorage. At the above distance, on the north shore, is the entrance to Seymour inlet, several islets lying just within it. A narrow pass of shallower water with depths of 4 and 10 fathoms continues for 3 miles to the E.S.E., communicating with a large sheet of water extending to the foot of mount Adams, and only one mile from Actæon sound. Wa wattle bay lies between the entrances to these two arms, and extends one mile in an E.N.E. direction with depths of from 23 to 18 fathoms water.

Seymour inlet, from its entrance to the head of Salmon arm, is 25 miles long, varying from three-quarters to 1½ miles in width, and maintains a depth of over 40 fathoms throughout to within 2 or 3 cables of the shore at its head. There are several indentations on both shores, the largest being Maunsell bay on the north shore; none, however, afford an anchorage. At 3 miles eastward of Maunsell bay are the Eclipse narrows where the tides run with great strength and no bottom could be obtained at 12 fathoms, these narrows lead to Salmon arm and Frederick sound, the latter extending 5 miles in a S.E. direction, the former 3 miles in a N.E. direction. Frederick sound terminates at the foot of mount Stephens, a conspicuous mountain 5,665 feet high, with a pointed overhanging peak close to it, 5,625 feet in height (*see* page 248) overlooking Mackenzie sound.

Salmon arm terminates at the foot of Perpendicular mountain, 5,000 feet high. Ta altz, a winter Indian village, is situated on the shore at its head.

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* *See* Admiralty charts:—Johnstone and Broughton straits, No. 581; scale, $m = 0{\cdot}5$ of an inch; also Vancouver island, No. 1917; scale, $m = 0{\cdot}15$ of an inch.

The continuation of Seymour inlet northward of Eclipse narrows terminates at 6 miles, a river flowing into it at its head, on which is situated a winter village of the Wa watl Indians.

BELIZE INLET.—From the Nak wak to rapids another branch, 3 cables wide, takes a westerly direction for 3 miles to Mignon point, where it suddenly turns back to the E.N.E., continuing in that direction almost in a straight line for 24 miles, with an average width of half a mile, and with deep water throughout; it lies between high ranges 3,000 to 4,000 feet high. From the head of Belize inlet to Maunsell bay, on the northern side of Seymour inlet, there is, according to Indian reports a portage about 2½ miles long.

Lassiter bay, at the head of the continuation of the inlet, between Harvell and Mignon points in a westerly direction, forms two small bights, with some few islets and rocks in it, but the water is inconveniently deep for anchorage.

MEREWORTH SOUND.—At 5 miles to the eastward of Mignon point, on the north shore, is the entrance to Mereworth sound, another similar inlet branching off to the northward, in which direction it continues for 4 miles, and then suddenly turning to the eastward for 6 miles, maintaining deep water throughout.

Flat rock, Square and Round islands, lie on the west shore at the entrance to Mereworth sound, with deep water around.

Strachan bay, at 1½ miles from the entrance to Mereworth sound, on the western shore, is the entrance to a small inlet which takes a westerly direction for 1½ miles, and has depths of 40 to 16 fathoms.

Village bay, on the opposite shore, abreast Strachan bay, is a small bay with two islets off its north point, and depths of 19 to 22 fathoms in it.

Westerman bay is a small bight 1½ miles long in a northerly direction, with from 30 to 20 fathoms water over it, except at its head, where it suddenly shoals to 3½ fathoms at 4 cables from the shore. The entrance to Westerman bay is 2 miles westward of the entrance to Mereworth sound.

The head of Westerman bay is separated from the termination of Strachan bay by a neck of land 1½ cables wide, forming to the eastward May peninsula, 1,160 feet high.

Allison sound.—At about 10 miles from the entrance to Mereworth sound, on the north shore of Belize inlet, is the entrance to Allison sound, another narrow branch which, like Mereworth sound, first takes a northerly direction (for 3 miles) and then suddenly turns to the eastward for 3 miles, finally turning again to the northward for a further distance of 2 miles, to

its head. At about 2 miles from the entrance Allison sound is only about 350 yards wide; here, in the middle of the passage, is a small islet (Obstruction islet) having a passage on either side of it 150 yards wide, with a depth of 10 fathoms in it.

The coast from Lascelles point, the north entrance point to Slingsby channel trends 7 miles W.N.W. to cape Caution, and is clear of danger.

Bremner islet, 58 feet high and covered with grass, lies 1½ miles W. ½ N. from Lascelles point, and half a mile distant from the shore.

GOLETAS CHANNEL,* which runs along the north shore of Vancouver island to the Pacific, is 22 miles long east and west, with a breadth varying from one to 2½ miles. Its shores are high, rugged, and steep-to, except in the western part, and may be generally approached to within a quarter of a mile; the northern side is composed of a group of islands (the principal of which are Galiano and Hope islands), mostly small, through which are several navigable passages. There are four anchorages in the channel, viz., Shushartie bay on the south side; port Alexander, Shadwell passage, and Bull harbour on the north side; and all, with the exception of the latter, are easily accessible to sailing vessels. Duval point, on the south side at the eastern entrance of the channel, is 15 miles west of Broughton strait.

The depths throughout the channel to the west entrance are very deep, varying from 190 to 80 fathoms, but there the bottom suddenly rises from 40 to 7 and 9, and in one part to less than 3 fathoms, forming Nahwhitti bar, stretching completely across the channel, and in a great measure preventing any heavy sea rising inside it during westerly gales.

Tides.—It is high water, full and change, in the Goletas channel at 0h. 30m., and the rise and fall varies from 12 to 14 feet. The tidal streams in the east part of the channel run from one to 3 knots, but near the west entrance, in the vicinity of the Nahwhitti bar, they are much stronger (2 to 5 knots), turning shortly after high and low water by the shore.

SHUSHARTIE BAY.†—From Duval point the south shore of Goletas channel runs 15 miles in a westerly direction to Shushartie bay, with a rugged rocky outline, and rises gradually to a chain of hills varying from 400 to 1,000 feet high; it is everywhere steep-to. Shushartie bay is about half a mile in extent, and its shores are high, except at the head, from which a sand-bank extends off more than 2 cables. There is a very limited but fairly sheltered anchorage just inside the north-east point of the bay, in about 13 fathoms, at the distance of one cable off shore, but

* *See* Admiralty chart of west end of Vancouver island (Goletas channel to Quatsino sound), No. 582; scale, $m = 0{\cdot}5$ of an inch: also Admiralty plan of Goletas channel, No. 555; scale, $m = 2$ inches.

† *See* Admiralty plan of Shushartie bay, No. 2,067; scale, $m = 3$ inches.

from the steepness of the bank it should only be considered as a stopping place.

Dillon rock, which covers at one-quarter flood lies 1½ cables west from Halstead island, which lies close off the east point of bay, and is in the way of vessels entering from the eastward.

Directions.—If entering Shushartie bay from the eastward, and the Dillon rock be covered, do not steer in for the anchorage till the easternmost peak of the Shushartie saddle (a remarkable double-topped mountain 1,900 feet high situated south of the bay) is seen in the centre of the bay bearing S. ¾ E., when proceed in with that mark on, which leads west of Dillon rock; when the north-east point of bay bears E. by N. ½ N., the vessel will be clear south of it, and should steer for the eastern shore.

Entering from the westward keep the western shore aboard till Halstead island bears E. by N. ½ N., when steer in as before directed.

Anchorage.—Anchor immediately 14 fathoms are obtained, as the bank is steep, which will be at about one cable's distance off it, with the extremes of the bay bearing N.E. and N.W. by W.

Shingle point, 2 miles west of Shushartie bay, is low; a beach runs off it a short distance; westward of this point it is difficult to land, except in fair weather.

CAPE COMMERELL, 22 miles west of Duval point, is the northernmost point of Vancouver island, and the south point of the west entrance to Goletas channel. The cape is low, and some rocks extend off it for nearly 2 cables; to the eastward of it the coast forms a large bay 3 miles wide and about one mile deep, with from 2½ to 6 fathoms rocky bottom, and not in any way adapted for anchoring. The shoal part of Nahwhitti bar, on which there is as little as 2½ fathoms, extends to the north-westward from the east point of this bay; it is marked by kelp and named Tatnall reefs. Weser islet 8 feet high lies in the western part of the bay, distant one-quarter of a mile from the shore. There is an Indian village on the east side of the cape.

Cape Commerell is situated in latitude 50° 52′ 35″ N., longitude 128° 3′ 0″ W.

GORDON GROUP consists of a number of small islands extending in an east and west direction for 5 miles, and bordering the north part of the east entrance of Goletas channel. They are high and steep-to, and on the eastern or Doyle island is Miles cone, a remarkable summit 380 feet high. Their eastern extreme is 2 miles north of Duval point.

Duncan island, one mile south of the Gordon group, is about one mile in circumference, and 300 feet high.

Noble islets, 30 feet high, lie 1½ miles west from Duncan island, between which and the group it is not advisable for a large vessel to go.

Balaklava island, 2½ miles long north-west and south-east, and from half a mile to one mile wide, and rugged and irregular, with three peaks, lies between the Gordon group and Galiano island, forming Christie and Browning passages. A small rock 4 feet high, surrounded by kelp, lies one cable south of the south-eastern Lucan islands, a group of three small islets lying parallel with the west shore of Balaklava island at the distance of 1¼ cables, and extending three-quarters of a mile from its south point. Raglan point, the north-west point of Balaklava island, has a ledge extending from it for 2¼ cables; and half a mile N.W. from the point are the Cardigan rocks, 6 feet high, with Croker rock 1½ cables N.E. from them. These rocks are surrounded by kelp.

Christie passage, between the west side of the Gordon group and Balaklava island, is half a mile wide, and its south entrance is nearly 6 miles from Duval point; it runs in a northerly direction, and connects Goletas with the New channel; some shoal patches with from one to 3 fathoms water on them lie 1¾ cables from the east shore of Balaklava island, and 6 to 7 cables S.E. by S. from Scarlett point (the east point of the island); between them and the island is George island. With these exceptions the shores of the passage are free from danger, and the depths in mid-channel are from 35 to 45 fathoms. The tide runs from one to 3 knots through it, the flood to the southward.

If intending to go through this passage from Goletas channel, a large vessel should enter it west of the Noble islets.

Browning passage, to the west of Balaklava island, between it and Galiano island, runs in a north-westerly direction from the Goletas to New channel. Its length is about 3 miles, its breadth in the narrowest part 2 cables, and there are some small rocks and islets off its south-east and north-east points; and a rock, which covers at three-quarters flood, lies on the west side of the channel about three-quarters of a cable from Galiano island, and 8 cables from the south-west entrance point of the channel. A reef of rocks and foul ground marked by kelp extends 1½ cables from Balaklava island, just opposite the above-mentioned rock, and this is the narrowest part of the channel, which is deep; a mid-channel course through is free from danger. The tide is very weak in this channel.

GALIANO ISLAND, the largest of the islands on the north side of Goletas channel, is of triangular shape, nearly 8 miles long, and 3½ miles broad, the base fronting to the southward. The shores are very much broken along the north and east sides; mount Lemon, a remarkable peak of conical shape 1,200 feet high, rises near its south-west part, and Magin saddle consisting of two peaks, 700 and 800 feet high, is situated at less than one mile from the west extreme of the island. Fort Alexander is formed at its south-east extreme.

The south side of Galiano island is high, steep-to, and cliffy, trending in a straight direction to the westward; at 4½ miles west from Boxer point is a small cove which would afford shelter to small craft from westerly winds.

Port Alexander, upwards of 7 miles from Duval point, and on the west side of Browning channel, indents the coast of Galiano island in a north-westerly direction for 1½ miles, with a general breadth of about 4 cables; there is a small islet in the middle of it, half a mile from the entrance, and another close off Boxer point on the west side of entrance. This port is easy of access to steamers, and sailing vessels with a fair wind, and affords good anchorage in 12 to 13 fathoms, at half a mile from its head, well sheltered from all except south-easterly winds.

SHADWELL PASSAGE, situated abreast Shushartie bay, and 1¾ miles N.N.W. from Halstead island, in the north-west part of the Goletas channel, between Galiano and Hope islands, is 3½ miles long in a northerly direction, and its breadth varies from one-half to 1½ miles; the eastern shore is straight in a north-easterly direction, but the western is indented into several small bays, with some rocks and islets off them, and foul ground extending nearly half a mile from the shore between Turn point and cape James.

The depths in the south part of this passage are from 80 to 100 fathoms, decreasing rapidly from 9 to 13 fathoms to the northward; a vessel may anchor about 2 or 3 cables north-west of Centre island, sheltered from all except northerly winds. The tidal streams set with considerable strength (4 knots) between Centre island and Turn point.

Vansittart island, in the centre of the passage at its north part, is one mile long, and three-quarters of a mile wide, and 260 feet high; west of it are some rocks and small islets extending 6 cables off it; and half a mile from the north point are two wooded islets 70 feet high called Nicolas islands.

Willes island, 208 feet high, at the south-east part of the passage close to Galiano island is steep-to, and may be approached to within a distance of one cable; a quarter of a mile to the south-east of it is a small low islet, named Slave island.

Centre island, in the middle of the passage, and 5 cables S.W. from Vansittart island, is small; west of it some kelp extends a short distance, but there is a passage on either side of it; that to the westward, however, is much obstructed by Suwanee rock, and it should therefore not be used.

Suwanee rock, which dries 4 feet at low-water spring tides, lies one cable W. by S. ¾ S. from the high-water mark of Centre island, rendering the passage west of that island unsafe.*

* The U.S. steam vessel *Suwanee* was wrecked on this rock in 1868.

One Tree islet, 4 cables west of Vansittart, is small, about 40 feet high, and has a single tree on its summit, which is very conspicuous when seen from the northward, and of great use in identifying the passage; this islet may be approached close-to on the west side, but between it and Vansittart are rocks and foul ground. Breaker reef, the outer of the dangers extending to the north-west from Vansittart island, lies half a mile N. by W. ¾ W. from One Tree islet.

Turn Point.—The south-western headland of the passage, Heath point, is 200 feet high, rocky, fringed with kelp, and presents a cliffy appearance. Turn point lies 2 miles north-east of Heath point about midway between it and cape James; it is backed by a summit 300 feet high.

Cape James, the north-west extreme of Shadwell passage, 2 miles N.N.W. ¾ W. from Turn point, is a rocky bluff 90 feet high; some rocks extend off it to the southward for a short distance, and foul ground, marked by kelp, exists between it and Turn point. The cape should at all times be given a berth of at least half a mile.

Tides. — The flood-tide runs to the southward through Shadwell passage at the rate of about 4½ knots, whilst the ebb, in the northern part, sets 2 knots in the contrary direction; to the southward of centre island, however, it runs as strong as the flood. Tide rips exist between Centre and Vansittart islands.

Directions.—Bound through Shadwell passage to the northward, round Willes island, its south-east point, at about one or 2 cables' distance, until abreast Turn point, when steer to pass about one cable off the east side of Centre island, and 2 cables west of One Tree islet, keeping the south peak of Magin saddle (on the west end of Galiano island), in line with the east end of Centre island bearing S.S.E., which leads through the northern entrance of Shadwell passage, passing half a mile east of cape James (north-west point of entrance) and 1½ cables west of Breaker reef in 9 to 17 fathoms water.

Shadwell passage may be used by steamers, or sailing vessels with a fair wind; it would hardly be prudent to beat a large vessel through it, as there is generally a heavy swell and strong tide in the north part. It is the passage usually taken by the Hudson Bay Company's vessels when bound north from the inner waters.

Bate passage, to the eastward of Vansittart island, is deeper, and nearly straight, and perhaps to a sailing ship or stranger it would be easier to navigate than the western one; if proceeding through it, keep in mid-channel. Vessels that do not steer well are recommended to use Bate passage instead of Shadwell passage.

Anchorage.—The best anchorage in Shadwell passage is near the middle, with One Tree islet bearing N.E. by N., Centre island S.S.E. ½ E., and Turn point S. ½ E., in 9 fathoms.

HOPE ISLAND, the westernmost of the group which forms the north side of Goletas channel, is 6 miles long, east and west, and its greatest breadth is 3¾ miles. The island is moderately high, and its shores are very much broken; the sea breaks heavily along its north and west sides, and off Mexicana point, the western extreme, a reef extends 3 cables; the south shore is steep, and may be approached to one-quarter of a mile.

BULL HARBOUR* has its entrance on the south side of Hope island, 2 miles from the western entrance of Goletas channel. Though small, this harbour affords a very secure landlocked anchorage. It runs in a northerly direction for 1½ miles across Hope island, its head being only separated from the north shore of the island by a narrow neck of low land 403 feet wide. The harbour, 5 cables wide at the entrance, is contracted to one cable at half the distance from the head, after which it again increases to nearly 2 cables.

Indian island, 1½ cables north of the narrowest part of the entrance, is small, but completely shuts in the harbour to the southward, leaving a passage to it on the eastern side one cable wide; between the island and the west shore there is only a depth of 11 feet.

Directions.—If intending to enter Bull harbour, steer up in mid-channel, passing east of Indian island, and moor immediately the vessel is north of it, anchors north and south. Only steamers or small sailing vessels should use this anchorage, as from its narrow and tortuous entrance it is rather difficult of access to long vessels.

Anchorage.—The anchorage is to the northward of Indian island, in about 4 fathoms water, but there is only room for one or two vessels of moderate size to lie moored.

Tides.—It is high water, at full and change, in Bull harbour at 0h. 30m.; springs rise 12½ feet.

Westward of Bull harbour the coast of Hope island is rocky and edged by kelp; the sea in westerly winds breaks heavily along it.

NAHWHITTI BAR, or ledge, stretching across the west entrance of the Goletas channel, is of sandstone formation, and on the eastern edge rises suddenly from 40 to 9 fathoms, the depth increasing very gradually to the westward. Its breadth within the 10-fathom line is

* *See* plan of Bull harbour on Admiralty chart, No. 2,067; scale, *m* = 3 inches.

from one to nearly 3 miles, it being broadest at the south part, where are several shoal spots. On the western edge of the bar the tide runs from 2 to 5 knots.

Tatnall reefs, with 2½ and 3½ fathoms on them, lie on the bar 1¼ miles from the south shore; northward of these patches the depths vary from 6 to 9 fathoms. In heavy westerly gales the sea breaks right across the Goletas channel at this bar.

Leading mark.—Boxer point (the south-east point of Galiano island), open north of Shingle point (Vancouver island), bearing E. ¾ N., leads over the Nahwhitti bar in the deepest water (from 7 to 9 fathoms) well to the northward of Tatnall reefs.*

Directions.—Bound to the westward through Goletas channel, steer in mid-channel, or within half a mile of either shore, until west of Bull harbour, after which keep Boxer point open north of Shingle point bearing E. ¾ N., until Mexicana point (west point of Hope island) bears North, when a vessel will be to the westward of the Nahwhitti bar. A sailing ship, if beating through the channel, should keep south of Duncan and Noble islands; elsewhere, until west of Bull harbour, the shores on both sides may be approached to within one-quarter of a mile; when standing to the southward, west of Bull harbour, tack when Shingle and Lemon points are in line bearing E. by N., and do not approach nearer than half a mile towards Mexicana point, as there is generally a heavy swell setting in on it, and the ground is uneven.

When crossing the bar in the deepest water, if the weather be clear, mount Lemon, a high conical peak, should appear nearly midway between Shingle point and Heath point on the opposite shore, or nothing to the southward of midway between them.

If obliged to anchor for the night, or tide, Shushartie bay, though small, is easy of access, the only danger being the Dillon rock off its east point (*see* page 258). Port Alexander, and Shadwell passage, along the north shore, are also, with a fair wind, easy of access to sailing vessels, and the latter is preferable, being more roomy with better holding ground.

NEW CHANNEL, to the northward of Goletas channel, and separated from it by the islands which form the north shore of the latter, is an extensive clear passage to the Pacific Ocean, about 12½ miles long, and a breadth varying from 1½ to 4 miles. Its depth in the shoalest part is 55 fathoms, near the eastern entrance, and its shores, except near the west part of the Gordon group, may be approached to within nearly

* *See* view on Admiralty chart, No. 555.

half a mile; the north limit of the channel is formed by Walker group to the eastward, and a few low rocks and islets to the north-west.

Generally a heavy swell sets through New channel from the westward, and, with the exception that there is more room for a large vessel to work in or out than in Goletas channel, there is no reason to use it in preference to the latter, unless, if running in before a heavy westerly gale, the sea were breaking across the west entrance of Goletas channel at the Nahwhitti bar.

Doyle island, the south-easternmost of the Gordon group and at the south-east point of New channel, is three-quarters of a mile long, and has a remarkable summit 380 feet high on its centre, named Miles cone, (page 258); there are some small islets off its east point. The north side of the Gordon group to Crane islets is steep-to, and may be approached to one-third of a mile.

Crane islets are small, 30 feet high, and steep-to, there being 100 fathoms water at one cable's distance. They lie $2\frac{1}{2}$ miles westward of Doyle island, and about 3 cables north of Gordon group.

Boyle island, $1\frac{1}{4}$ miles west from Crane islets, and half a mile north of Hurst island (Gordon group), is small.

Grey rock, which covers at one-quarter flood, lies half a mile north-west from Boyle island, and is dangerous to vessels beating through this channel. The best mark to clear this rock, is to keep the Crane islets just touching the north side of Gordon group bearing E. by S. $\frac{3}{4}$ S., which leads nearly half a mile north of it; when Boyle island bears South a vessel will be clear east of it, and when the south-west and north-east points of Christie passage come open bearing S. $\frac{1}{4}$ W., she will be clear to the north-west of it.

The COAST.—The north shore of Balaklava island is rugged, and half a mile N.W. from its north-west point are three low islets (Cardigan rocks), 6 feet above high water, at the north entrance to Browning channel.

The north shore of Galiano island is also rugged; some outlying rocks lie a short distance off it, but it may be approached to one-third of a mile.

Westward of cape James, the north-east point of Hope island, the shore is generally rocky, and the sea breaks heavily along it; do not approach it within half a mile.

WALKER GROUP, between which and the Gordon group lies the New channel, is composed of two large islands and several small islets and rocks covering an extent of 6 miles in a westerly direction, and 2 miles broad; the higher and western of the two larger islands (Kent) is about 320 feet above the sea; the eastern (Staples) is 295 feet; among

them are several small creeks and bights, which would afford shelter to boats, or even small craft; along their south side some rocks extend a short distance off.

Castle point, at the east extreme of the group, is bold, cliffy, and steep-to, with no bottom at 60 fathoms at 2 cables south of it.

White rock, at the south extreme of Walker group, lies 2 miles W.S.W. from Castle point; it is 4 feet above high water, and there are 40 fathoms half a cable south of it. Between White rock and Boyle island a strong tide race usually prevails.

Ragged reef, a cluster of rocks 4 feet high and 4 cables in extent, lies 6 cables to the northward of the west end of Kent island (Walker group).

Nye rock, off the south end of Schooner passage, at the west part of the group, covers at high water; it lies 2¼ miles W. ½ N. from White rock, and may be approached to within a distance of 2 cables on the south side; but large vessels should not stand inside it to the northward.

Redfern island, the south-west of Walker group, is about half a mile long, and one-quarter of a mile wide; half a mile south-east of it are some rocks just above high water, as also to the north-west; its south side should not be approached within 2 cables.

Hedley islands, a group of small rocks lying in mid-channel between Kent and Staples islands and Redfern island, occupy a space east and west of 1¼ miles; a reef which covers at high water lies 4 cables to the eastward of them, and 6 cables distant from the south side of Kent island. Schooner passage, which is not recommended, lies between Hedley and Kent islands.

Prosser rock, 2 miles W. by N. ¾ N. from Redfern island, is small, about 2 feet above high water, and may be approached to within a distance of 2 cables.

Bright islet, nearly one mile farther in the same direction, is 100 feet high; half a mile N.E. by N. from it is a reef which covers at high water, and one mile E. by N. ½ N. lies Herbert island, with a reef lying between.

Pine island, at the north-west part of New channel, about one mile in circumference, bold, wooded, and about 250 feet high, is conspicuous from the westward.

Tree islets, some small islets, which are also wooded, lie half a mile N.E. from Pine island.

STORM ISLANDS, in the centre of Queen Charlotte sound, 2½ miles northward of Pine island, are a narrow chain of islets extending 2 miles east and west, and form a most useful land-mark when crossing Queen Charlotte sound. The tops of the trees are about 150 to 200 feet above

high water, and on the western part is a single tree which is conspicuous. There are no off-lying dangers beyond 3 cables. An Indian fishing village is situated on one of the group, near the east end.

Reid island, the easternmost of the Storm islands, on the north side of Sealed passage, is about 300 yards long E.N.E. and W.S.W., and 150 yards broad, having a rock above water half a cable off its west end.

Naiad islet is bare and 48 feet high; it lies half a mile N. E. ½ N. from Reid island.

Sunken rock, on which the sea breaks in bad weather, lies about 5 miles N.E. of Shadwell passage; from the centre of the rock, Bright island bears S.E. by E., 1½ miles, and Pine island, West 1½ miles.

SEALED PASSAGE, 5 miles to the northward of Shadwell passage, between Pine island and the Storm islands, is about 2½ miles wide. This passage should not be attempted.

Blind reef, on which the sea breaks in heavy weather, extends nearly across Sealed passage, and closes it to navigation; close to the west edge of Blind reef there are 17 to 40 fathoms, rocky bottom.

Water can be obtained at the Indian fishing station on Storm islands.

South rock, awash at low water, lies about 1¾ miles north-eastward from Blind reef; from the centre of this rock, Pine island bears S.W. by S. 3½ miles nearly, and Reid island W. ¼ N. 1¾ miles.

Middle rock, on which the sea nearly always breaks, is covered at three-quarters flood, and lies one mile N. by W. from South rock.

North rock, on which the sea nearly always breaks, is awash at high water, and lies N.E. three-quarters of a mile nearly from Middle rock. Harris islet a little open south of Jeanette island, bearing E. by S. ½ S., leads half a mile to the northward of North rock.

Directions.—If using the New channel, and the wind be fair, a mid-channel course about W. by N. will take a vessel clear. If working through, when between the Walker and Gordon group, keep one-third to one-half of a mile south of the southern shores of the former, and on nearing the Grey rock, when standing towards the southern shore, avoid opening the south part of Crane islets north of the Gordon group E. by S. ¾ S., until the east and west points of Christie passage come open bearing S. ¼ W., or the eastern edge of Redfern bears N.N.W. ½ W., when a vessel will be clear to the westward of the rock; and if going east, when Boyle islet bears South ¼ E. will be east of it. In the vicinity of the Galiano and Hope islands, tack about half a mile off shore, and keep

outside Shadwell passage and Roller bay; when west of Pine island, do not bring it to bear east of E. by N.

The COAST from cape Commerell (page 258), the north-west point of Vancouver island, takes a south-west direction for 16 miles to cape Scott. It is rather low, but rises at a distance inland to hills 800 and 1,000 feet high; it is indented by several bays, which, however, are too open to afford any shelter, except in southerly winds; foul ground extends off in some places more than one mile.

Hecate rock, lying 1½ miles W. by S. from cape Commerell, and three-quarters of a mile off shore, covers at three-quarters flood, and the sea breaks heavily over it. Lemon point (Galiano island) just open of or touching Shingle point (Vancouver island) bearing E. by N., leads three-quarters of a mile north of it.

CAPE SCOTT, the extreme north-west point of Vancouver island, is a small promontory about 500 feet high, connected to the island by a low sandy neck about one cable wide; some rocks extend west from it for more than half a mile.

Shelter.—There is a bay on both sides of the neck, which would afford anchorage to boats or small craft in fine weather only; close to its south-west extreme is a small creek among the rocks, difficult of access, but, once within it, boats may get shelter in southerly gales; unless acquainted with the locality, it would, however, be hardly prudent to venture for it in bad weather.

At cape Scott the flood comes from the southward, and rounding the cape sets into the Goletas channel, its strength varying from one to 3 knots.

When navigating between cape Commerell and cape Scott, do not approach the shore within 1½ miles, at which distance there are depths of from 16 to 20 fathoms.

SCOTT CHANNEL, between cape Scott and Cox island (the easternmost of the Scott islands) to the westward, is 5¼ miles wide, with depths in it varying from 25 to 40 fathoms. It is a safe navigable channel for any class of vessel, the only known dangers in it being the rocks extending nearly one mile west from cape Scott; the tide runs through from one to 3 knots, the flood from the southward. There are some heavy tide rips near its east and west sides, but a large vessel may beat through with safety, tacking when upwards of one mile off cape Scott, or half a mile of Cox island.

SCOTT ISLANDS, five in number, with some adjacent smaller islets, extend nearly 20 miles in a west direction from cape Scott. There are wide passages between the western islands, but as no soundings have

been obtained in them, and strong tide rips and overfalls have invariably been observed raging there, no vessel should venture among or through them, unless compelled to do so.

Westward of cape Scott the tides set with considerable strength to the north and south across the entrance to Goletas channel, and a vessel passing out northward of the Scott islands must beware that she is not set down too near them with the ebb stream.

Along the north side of the Scott islands, at a distance of 2 miles, are depths of from 30 to 50 fathoms; at 2 miles west of Triangle island are 45 fathoms, and from 5 to 6 miles southward of the group from 80 to 100 fathoms.

Cox island, 1,047 feet high, the easternmost and largest of the group, is about 2½ miles in extent, with iron-bound rocky shores and several off-lying dangers. This island forms the western boundary of the Scott channel, and is upwards of 5 miles W. by S. from cape Scott.

Lanz island, separated from Cox island by a passage half a mile wide, is upwards of 2 miles long in a westerly direction, and one mile broad; its shores, like Cox island, are rocky, and it rises near the centre to a summit 1,177 feet above the sea; both the islands are wooded.

There are 17 fathoms in the passage between Cox and Lanz islands, and in fine weather with southerly winds a vessel may drop an anchor northward of the former island in 14 fathoms, but at all times it is a neighbourhood to be avoided.

East Haycock, a small islet 80 feet high, is 2½ miles south-west from Lanz island; it has a rugged outline, and is covered with a few stunted trees. Some small islets extend a short distance north-west of it.

West Haycock, 5 miles W. ¼ S. from East Haycock, is small and rocky, about 180 feet high. Some small islets extend upwards of one mile south-west of it, foul ground existing around them for half a mile.

Triangle island, the westernmost of the group, 25 miles W. by S. from cape Scott, is 680 feet high, about one mile in extent, and differs from the other islands in being very precipitous and bare of trees, and has a remarkable gap in its summit; a ledge or reef extends one mile north-west of it; to the eastward are three low islets, the outermost of which, 40 feet high, is 1¾ miles from Triangle island.

When navigating near the Scott islands, it is recommended to give them a good offing, especially in a sailing vessel, as the tides set very strongly through the passages between them.

Navigation.—For steamers, the navigation of the inner waters between cape Mudge and the Pacific is very simple, the only caution

required being to steer mid-channel; if the weather be fine, except in the vicinity of the Nimpkish river, Helmcken island, and Seymour narrows, these waters may be navigated as well by night as during the day, the shores being so high on either side as to be easily defined.

If in a sailing vessel, unless the wind be fair and likely to remain so, it would be preferable to anchor for the night, as the wind usually falls after sunset, especially during summer months.

Water is generally so plentiful that at every valley or beach a stream will be found.

Supplies.—The natives, whenever a vessel stops, will generally bring alongside deer, grouse, salmon, rock cod, and other fish in moderate quantities, selling them at reasonable prices. Blankets, shirts of the most common description, knives, beads, powder, shot, tobacco, and red paint are very useful to barter with. To men-of-war they are usually very civil, but crews of coasters and merchant vessels should watch them vigilantly, as they are cunning and treacherous (especially near the northern parts of Vancouver island), having captured several small coasters and murdered their crews.

CHAPTER VII.

WEST COAST OF VANCOUVER ISLAND, FROM JUAN DE FUCA STRAIT TO SYDNEY INLET.

VARIATION, 23° 0′ E. in 1888.

GENERAL DESCRIPTION.—The outer or western coast* of Vancouver island is comprised between Bonilla point, at the entrance of Juan de Fuca strait, and cape Scott, the north-west extreme of the island, a distance of upwards of 200 miles. Its general direction is W.N.W. and E.S.E., but the coast is broken into deep inlets, the principal of which, Barclay, Clayoquot, Nootka, Kyuquot, and Quatsino sounds, are large sheets of water, with features similar to the other great inlets on this part of the American continent.

Making the land.—When first making the land, an unbroken range of mountains will be seen; on a nearer approach it appears thickly wooded, and apparently fertile, intersected with many deep openings and valleys, which in most cases are some of the inlets before mentioned. The coast is mostly low and rocky, but rises immediately to mountains of considerable height. It is fringed by numerous rocks and hidden dangers, especially near the entrances of the sounds, and the exercise of great caution and vigilance will be necessary on the part of the navigator to avoid them, even with the Admiralty charts. On no occasion, therefore, except where otherwise stated in the following pages, should a stranger attempt to enter any of the harbours or anchorages during night or thick weather, but rather keep a good offing until circumstances are favourable; and when about to make the coast, it cannot be too strongly impressed on the mariner to take every opportunity of ascertaining his vessel's position by astronomical observations, as fogs and thick weather come on very suddenly at all times of the year, more especially in summer and autumn months; and the current generally sets to the south-east, across the entrance to Juan de Fuca strait (*see* page 10). The use of the lead is strictly enjoined.†

WINDS.—The remarks with regard to wind and weather given in the introductory chapter apply generally to the outer coast of Vancouver island, with this exception, that bad weather in winter months is more frequent there than to the southward.

* *See* Admiralty chart of Vancouver island, No. 1917; scale, $m = 0{\cdot}15$ of an inch.

† In the vicinity of Barclay sound cape Beale will be easily recognized by the lighthouse. The light is visible in clear weather from a distance of 19 miles.

Tides.—All along the outer or west coast of Vancouver island it may be said to be high water at full and change when the moon crosses the meridian, viz., at noon and midnight, the tide showing considerable regularity as compared with the inner waters, the greatest rise and fall being everywhere about 12 feet. There are two high and low waters in the 24 hours all the year round. In summer months the superior high water is at midnight, and in winter months at noon.

The flood stream appears to set along the coast to the north-west, and the ebb to the south-east; neither are of great strength, except in the vicinity of Fuca strait and the Scott islands. In summer months a set is generally found to the southward, and in winter in the opposite direction, but as a rule the currents are irregular, and apparently influenced by prevailing winds.

Soundings.—At the entrance of Fuca strait the 100-fathom edge of the bank extends 40 miles off shore; it then runs nearly straight in a N.W. by W. direction, gradually nearing the coast, and abreast cape Cook or Woody point the depth of 100 fathoms will be obtained within 4 miles of the shore; to the north-west of Woody point the 100-fathom edge does not extend more than 10 miles off shore, and to the southward and westward of the Scott islands even less.

The nature of the bottom, when under 100 fathoms, appears to be generally composed of sand and gravel, and does not differ in one part from another sufficiently to afford any guide for ascertaining a vessel's exact position on the coast; the bank, however, extends far enough off shore to the south-east of cape Cook, to enable the mariner making the coast in thick weather, by sounding in time, to get due notice of his approach to the land, as the edge of 100 fathoms does not come within 18 miles of it, and the bank shoals very gradually.

Natives.—The west coast of the island is very thinly populated, the highest estimate of the natives not exceeding 4,000, divided into a number of very small tribes. As a rule they are harmless and inoffensive, though in a few cases the crews of vessels wrecked on their coasts have been plundered and ill-treated: they are addicted to pilfering, especially in the vicinity of Nootka sound, and ought to be carefully watched; this is perhaps the worst charge that can be brought against them.

All the tribes speak a different dialect, and the Chinook jargon, which is used at Victoria in transactions with the settlers and natives, will not be generally understood on the west coast.

Supplies.—The natives live principally on fish, potatoes, and berries. Fish, salmon, halibut, rock cod, herring, and hoolican, the

latter somewhat resembling a sardine, are found in great abundance. Deer, grouse, and wild fowl are also to be had, but they are not by any means so plentiful as along the north-east coast of the island.

Trade.—Furs and fish oil are the only articles of trade with the natives, and the quantity of each procured is small.

At the Alberni inlet in Barclay sound a large saw mill was established in 1860 by an English company, and a considerable lumber trade was carried on.

At Forward inlet and Coal harbour, in Quatsino sound, seams of coal of considerable thickness have been seen, and there is no doubt that a quantity of that valuable article is to be met with in the north-west part of the island.

Indications of copper and iron are also plentiful, especially in Barclay sound. In port San Juan, and in the Muchalat or Guaguina arm of Nootka sound, some traces of gold have been met with.

The COAST* from port San Juan (page 29) trends 10 miles in a westerly direction to Bonilla point, rising gradually to elevations from 1,000 to 2,000 feet. Bonilla point, the north entrance point of Fuca strait, is 12 miles N.N.W. from cape Flattery; the point slopes gradually to the sea, is not in any way remarkable, and may be approached within one mile; to the westward of it the coast becomes more broken, still keeping a westerly direction, being high a short distance inland.

Nitinat lake, the entrance to which is narrow and shoal, is 7 miles westward of Bonilla point. The lake is of considerable size, extending to the northward. There are only one to 2 fathoms in the entrance, and the sea generally breaks heavily across it in bad weather. Four miles to the westward of the entrance is a remarkable waterfall, called by the natives Tsusiat, which may be seen at a good distance, even in thick weather, when it would help to identify a vessel's position, being the only waterfall on this part of the coast.

Pachena bay, 20 miles westward of Bonilla point, is nearly 2 miles deep in a northerly direction, and half a mile wide, with from 5 to 6 fathoms water, but as it is open to the southward and south-west, and there is usually a heavy swell setting into it, no vessel should anchor there. At its head, on the west side, is a stream where boats can get in and find shelter in bad weather.

Sea-bird islet, off the entrance of the bay, is bare, about 10 feet above water, and of small extent.

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* *See* Admiralty chart:—Sydney inlet to Nitinat, No. 584; scale, *m* = 0·5 of an inch.

A rock which does not uncover lies half a mile S.W. from Sea-bird islet, also at one-third of a mile E. by S. ½ S. from the islet there is a similar rock that breaks at very low tides. Sea-bird islet should not be approached within 1½ miles.

The coast between Pachena bay and the south-east point of entrance of Barclay sound, a distance of 3 miles, is rocky, forming an open bay that affords no shelter.

The soundings between port San Juan and Barclay sound, at a distance of 2 miles off shore, vary from 50 to 18 fathoms, shoaling when to the westward of Nitinat lake, 10 miles to the southward of which will be found less than 50 fathoms.

BARCLAY SOUND,* an extensive arm of the sea, 30 miles westward of the entrance of Fuca strait, is upwards of 14 miles wide at its entrance, and though encumbered by numerous islands it maintains this breadth for nearly 12 miles inland, when it separates into several narrow inlets or canals, the principal of which, the Alberni inlet, extends 23 miles in a northerly direction, its head reaching within 14 miles of the eastern or inner coast of Vancouver island. Off the entrance, and in the southern parts of the sound, are innumerable rocks and islands, with several navigable channels between them, which, however, ought to be used with great caution by a stranger. The shores are low, except in the northern part and among the canals, when they become high, rugged, and mountainous.

Tides.—It is high water, full and change, in Barclay sound at 0 h., and the rise and fall of tide is about 12 feet.

Soundings.—A bank of sand and gravel, with depths from 25 to 45 fathoms, extends 40 or 45 miles to the southward and westward of the entrance of Barclay sound. In the middle of this bank is a deep hole, the east part of which is 5 miles south-west from the entrance; from thence the hole extends 19 miles in a W.S.W. direction, with depths varying from 60 to 100 fathoms, so that if steering for Barclay sound from the south-west, and the weather be thick, by attention to soundings a vessel might ascertain her position within a few miles. To the south-east of the entrance the water becomes deeper, and at a distance of 10 miles off shore there are 60 to 70 fathoms, sand and mud.

There are three navigable ship channels into Barclay sound, viz., the Eastern, Middle, and Western, and all require great caution in navigating.

The Eastern channel, on the eastern side of Barclay sound, between the main shore and Deer islands, is 12 miles long in a N.N.E. direction, and its breadth varies from one to 1½ miles. Its shores are

* *See* Admiralty plan of Barclay sound, No. 592; scale, $m = 1{\cdot}65$ inches.

low and rugged, except in the north part, which becomes high. The depths in the entrance vary from 18 to 22 fathoms, increasing gradually to 90 and 100 fathoms at the north part. There are several dangers within it; viz., the rocks off cape Beale and Channel rocks at the southern part, and the Fog rock off the east side of Tzaartoos island.

Cape Beale, the south-east entrance point of Barclay sound, and of the Eastern channel, is 30 miles N.W. by W. ½ W. from the lighthouse on Tatoosh island. It is a bold rocky point, 120 feet high, (the tops of the trees being 300 feet above high water,) and some rocks extend off it, from 2 to 4 cables.

LIGHT.—Situated on a small islet at the extremity of cape Beale, is a square lighthouse coloured of a light stone colour 35 feet in height, from which is exhibited, at an elevation of 164 feet above the sea, a *flashing* white light, which shows a *bright flash* every *half minute*, and should be visible in clear weather from a distance of 19 miles.

The lighthouse is situated in latitude 48° 47′ 20″ N., longitude 125° 13′ 30″ W.

Caution.—The light should not be brought to bear eastward of E. ½ N. so as to avoid the foul ground which extends off the entrances to Barclay sound.

Bamfield creek.—At 4 miles from cape Beale, on the east side of the Eastern channel, is the entrance to two creeks, the southern of which extends 1¼ miles in a southerly direction, with a breadth of from one to 2 cables; there is room for a vessel to moor at a short distance from its head in 6 fathoms. A narrow passage, 30 yards wide, with 6 feet at low water, runs from the head to an inner basin, which is one mile long, and has from 2 to 4 fathoms.

Grappler creek, the northern arm, extends two-thirds of a mile to the eastward from the entrance of Bamfield creek, being about 40 yards wide, with from 8 to 10 fathoms, after which it takes a northerly direction for one mile, and becomes very shoal. Both these creeks afford good sheltered anchorage to small craft.

Kelp bay, 5¾ miles from cape Beale, is two-thirds of a mile wide, one-quarter of a mile deep, and affords a fairly-sheltered anchorage in from 6 to 14 fathoms. Its shores are low, and a rock which covers at one-third flood lies one cable north of its south entrance point, and there is a small islet at its north point, which shows a conspicuous white mark; foul ground, marked by kelp, exists in the north part of the bay.

If intending to anchor in this bay, give the entrance points a berth of 2 cables, and anchor in its south part in 6 or 14 fathoms, with the entrance

points bearing S.W. by W. and N. by E. This anchorage is easy of access, but the bottom is irregular.

Mark islet, 8 miles from cape Beale, and one cable off the east side of the channel, is small and wooded, and conspicuous from the entrance of the Middle channel; the shore between it and Kelp bay runs nearly straight, and may be approached to within a distance of 2 cables.

Numukamis bay, 9 miles from cape Beale, at the north-east part of the Eastern channel, is of an oblong shape, 3 miles wide and 1½ miles deep; its shores rise gradually to mountains from 1,000 to 2,000 feet high. From the centre of its head the Sarita valley extends away to the eastward, a stream of considerable size flowing from it into the bay. In the centre of the bay are the San José and Reef islets, of small extent, and low; from the south point of the latter islet a reef extends one cable.

The depths in Numukamis bay are from 70 to 105 fathoms, and there is no anchorage except in Christie bay, in its south corner, where there are from 10 to 6 fathoms at a distance of 1½ cables from the shore. The shores of Numukamis bay are steep-to, except off Sarita valley, where a sand-bank extends out half a mile.

Poett nook, in the south part of this bay, about one mile within its south-west point, is a landlocked basin, about 3 cables long and 2 cables wide, with 7 fathoms water. The entrance to it is nearly straight, one cable long, and 150 feet wide, with 7 fathoms in the shoalest part; it is difficult for large vessels to enter unless they warp in.

There are three small creeks on the north side of Numukamis bay, but the water is too deep for anchorage.

Turn island, at the north-east point of the Eastern channel, and dividing it from the Alberni channel, is small and wooded, and separated by a narrow boat pass from the east shore. At one-third of a mile south of it is a narrow creek, 3 cables long and half a cable wide, with from 9 to 12 fathoms, available for small craft.

Ship islet, at the south-west point of the Eastern channel, 2 miles N.W. ½ N., from cape Beale, is 100 feet high, and rocky, with a few remarkable trees on its northern part, which at some distance seaward give the islet the appearance of a ship under sail, forming a good mark for identifying the channel; there are depths of from 23 to 24 fathoms at 2 cables' distance from it.

DEER ISLANDS form the western boundary of the Eastern channel, and extend in a N.N.E. and S.S.W. direction for 10 miles, with a breadth varying from one to 2 miles. They are low, and of

inconsiderable size, except the northern (Tzaartoos island), which is 1,026 feet high in parts, and of considerable extent. There is only one navigable passage through them, the Satellite pass, between Helby and Hill islands.

King island, the southernmost of these islands, is from 300 to 400 feet high, about one mile long and half a mile broad; its shores are very rugged and broken, with rocks extending from one to 2 cables off. This island is separated from Ship islet by a passage one-third of a mile wide but there is a rock in the middle of it, which is awash at high water.

Channel rocks, on the west side of the channel, 3 cables east of King island, and one mile E.N.E. from Ship islet, are about one cable in extent, and cover at half flood; there are 10 to 12 fathoms at the distance of one cable to the eastward of them, and the sea generally breaks over them; they must be carefully avoided.

Leading mark.—Turn island, at the north-east point of the Eastern channel, shut in by Leading bluff of Tzaartoos island bearing N. by E. $\frac{3}{4}$ E., leads 4 cables east of the Channel rocks, and one cable west of the rocks off cape Beale.*

Diana island, 350 to 400 feet high, separated from King island by a passage full of rocks, is of triangular shape, about $1\frac{1}{4}$ miles long, and three-quarters of a mile broad; its shores are rocky. Taylor islet, 50 feet high, lies 3 cables S.S.W. $\frac{1}{2}$ W. from its south-east point.

Todd rock.—At a distance of 2 cables from the east side of Diana island is the Todd rock, a rock awash at high water, with 16 fathoms close to it.

Entrance anchorage.*—Helby island, the next island northward of Diana, has off its north side a small but well-sheltered anchorage in from 6 to 9 fathoms, easy of access from either the Eastern or Middle channels, and very convenient as a stopping place for vessels entering or leaving Barclay sound.

Wizard islet, to the northward of the anchorage, is small, about 8 feet high, and bare. It is about 4 cables north of Helby island, and vessels intending to anchor should do so about one cable south-west of the islet in 6 fathoms.

Hill island, two-thirds of a mile north of Helby island, and separated from it by the Satellite pass, is small, with a summit of moderate height at its southern end. At a quarter of a mile south of it is a patch of $3\frac{1}{2}$ fathoms, marked by kelp, and there are several small islets and rocks off its east and west sides.

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* *See* View B. on Admiralty chart, No. 584.

† *See* plan of Entrance anchorage on Admiralty chart, No. 584; scale, $m = 3$ inches.

Robbers island, separated from Hill island by a passage full of rocks, is 2 miles long and one mile broad at its widest part. It is low, and steep-to on the eastern side, and between it and Tzaartoos island is a small landlocked basin of 5 to 7 fathoms water, but almost inaccessible in consequence of the many rocks at its entrance.

Tzaartoos or Copper island, the northernmost of the Deer islands, is 4½ miles long in a N.N.E. direction, and 1½ miles broad. It is higher than the other islands, rising in many parts to 800 and its summit to 1,026 feet; its eastern side, except in the vicinity of Sproat bay, is steep-to, and may be approached to within a distance of 2 cables. Limestone of a fine quality is to be found in its northern part, and there are several indications of copper and iron ores.

Sproat bay, on the east side of Tzaartoos island, is about half a mile wide and 2 cables deep. In its centre are two small islets, and between them and the southern side of the bay a vessel may anchor in from 11 to 15 fathoms.

Leading bluff, situated just south of the bay, is a steep point 405 feet high, and conspicuous from the entrance of the Eastern channel.

Fog rock, lying about 2 cables east of Sproat bay, is of small extent, with only 9 feet over it, and steep-to all round. This danger is in the track of vessels using Sproat bay, and requires caution to avoid it, not being marked by kelp in the spring.

The east sides of Hill and Robbers islands open of Leading bluff bearing S.W. ¾ S., lead south-east of Fog rock, and the west side of Nob point well open east of Limestone point N. ¼ W. leads well east of it.

Nob point, the south-west entrance point of Alberni inlet, and north-west point of Eastern channel, is about half a mile to the northward of Tzaartoos island, and nearly 13 miles from cape Beale. It is a remarkable cliffy projecting point 475 feet high, steep-to on its south and east sides.

ALBERNI INLET, at the north-east part of Barclay sound, runs in a winding northerly direction for 22 miles, with a breadth varying from 2 cables to one mile, and terminates in a fine capacious anchorage at its head; the shores on either side are rocky and rugged, rising abruptly from the sea to mountains 2,000 and 3,000 feet high; at the head, however, the land becomes low and fertile, a large extent being fit for cultivation. A settlement and large saw mills are established there, and quantities of timber exported. There is also a salmon fishery.

The depths to within one mile of the head vary from 160 to 40 fathoms, and the shores of the inlet are everywhere free from danger.

The entrance between Nob point and Turn island lies at the termination of the Eastern channel, 13 miles N.N.E. from cape Beale.

San Maeto bay, on the east side of the inlet, 1½ miles north of Turn point, is three-quarters of a mile wide, and one mile deep; its shores are high, and the soundings in it vary from 20 to 50 fathoms, being too deep for anchorage.

Mutine point, midway between this bay and Turn island, is rocky, and as at a short distance off it a rock is said to exist, a berth of 2 cables should be given in passing. Just south of this point is a small bay with irregular soundings from 11 to 17 fathoms, which might be used as a stopping place.

UCHUCKLESIT HARBOUR,* on the west side of Alberni inlet, 2 miles within Nob point, is 3 miles long in a westerly direction, and its average breadth is about half a mile; the north shore is high, rising gradually to mountains of 2,000 and 3,000 feet, but the south shores and head are low; all are free from danger at a distance of one cable. The depths vary from 20 to 40 fathoms, and there are two secure anchorages, Green cove at the entrance, and Snug basin at the head, with from 9 to 15 fathoms water. Limestone of a very fine quality is to be procured at the head of the harbour.

Green cove, just within the entrance, on the north side of harbour, affords a snug, well-sheltered anchorage, in from 9 to 14 fathoms. Harbour island, off its south side, and completely landlocking the anchorage in that direction, is of small extent, with a clear deep passage on either side into the anchorage; a rock lies half a cable off its south-east point.

This anchorage is convenient as a stopping place for vessels bound to or from Stamp harbour at the head of Alberni inlet, and the entrances to it, on either side of Harbour island, make it available to sailing vessels or steamers.

Steamer passage, on the east side of Harbour island, leads into Green cove; it is 2 cables long, and about 150 yards wide in the narrowest part, with not less than 9 fathoms, but it should only be used by steam vessels, or sailing ships with a fair wind.

Ship passage, which leads into Green cove north of Harbour island, is 4 cables long, and 2 cables wide, clear of danger, with from 11 to 20 fathoms, and available for sailing ships unable to enter or leave Green cove by Steamer passage.

Snug basin, on the north side of the head of Uchucklesit harbour, is half a mile long in a northerly direction, about 2 cables broad, is well

* *See* plan of Uchucklesit harbour on Admiralty chart, No. 584; scale, *m* = 3 inches. In Uchucklesit harbour spring tides rise 12 feet.

adapted for refitting or repairing a ship, and affords anchorage in 12 to 14 fathoms; but the entrance, though deep, is only 150 feet wide.

Water.—On the north shore, one mile from Green cove, is a large stream of fresh water, with a bank extending a short distance off it.

From Uchucklesit harbour, Alberni inlet trends N.E. by E. for 3 miles, and is steep-to on both sides, after which it takes a N. by W. direction to its head.

Nahmint bay, on the west side of Alberni inlet, 10 miles within its entrance, is about half a mile in extent, with from 19 to 20 fathoms water, and may be used as a stopping place, if working down the inlet; a large stream disembogues at its head.

The First narrows, 13 miles from the entrance of the inlet, are 3 cables wide at low water, steep-to on the west side, with 26 fathoms in mid-channel; if passing through them at high water, keep well over to the western shore.

The Second narrows, 18 miles from the entrance, are 2 cables wide at low water, steep-to on the east side; the west side dries out one cable at low water. The depth in mid-channel is 40 fathoms; and in going through them a vessel ought to keep well over on the eastern side.

STAMP HARBOUR, at the head of Alberni inlet, is a capacious and secure anchorage, 2 miles in length, and varying in breadth from 4 cables to one mile. Its western shore is high and rocky, but the eastern side and head are low and fertile, with a quantity of clear level land, almost fit for cultivation. The Somass river, a stream of considerable size, flows into the head of the harbour, and is navigable for canoes several miles; it has its source in a chain of extensive lakes in the interior of Vancouver island, and the quantity of water discharged from it is so great that there is a constant current out of the inlet, often exceeding one knot in strength. There is a settlement about 1½ miles up the river, which is increasing.*

Great quantities of the finest timber in the world for spars are exported from this place, and vessels of considerable size may lie close to the saw mill† without grounding, as there are 4 fathoms almost alongside it.

Observatory islet, in the centre of the harbour, is a small bare rock about 6 feet above high water; some rocks extend half a cable north of it, but it may be approached within one cable.

* Commander F. Edwards, H.M.S. *Mutine*, 1884.

† A steam-tug is attached to the saw-mill establishment situated at the head of Stamp harbour for the purpose of towing vessels through the Eastern channel; when a vessel is expected the tug generally lies in Dodger cove, at the entrance of Middle channel, where a good look-out can be kept. It is believed that this establishment has since been abandoned.

Sheep islet, in the north-west part of harbour, and 6 cables from Observatory islet, is wooded, and connected to the head of the harbour at low water by a sand-bank.

Anchorage.—The anchorage in the harbour is in 8 to 12 fathoms, at the distance of three-quarters of a mile from the head, with Observatory islet S.W.*

Supplies.—Game is plentiful, and there is excellent fishing in the river and lakes. Fresh beef, vegetables, and fruit are plentiful and cheap.

Directions for BARCLAY SOUND.—Entering Barclay sound through the Eastern channel, the south-east entrance point, cape Beale, may be easily recognised from the south-east, by the lighthouse and by the islands west of it, Ship islet being also very conspicuous from the trees on its north part. When approaching or rounding the cape do not come nearer than half amile to avoid the rocks off it, until Turn island at the north part of Eastern channel is well shut in by Leading bluff (Tzaartoos island) bearing N. by E. $\frac{3}{4}$ E.,† when steer up the Eastern channel with that mark on, which will lead clear of the rocks off the west side of cape Beale, and east of Channel rocks. When north point of Ship island is in line with south point of King island bearing S.W. by W. $\frac{1}{2}$ W., the vessel will be well north of the latter, and may then steer up mid-channel about N.N.E.; on nearing Leading bluff, keep the east side of Hill island open south of it bearing S.W. $\frac{3}{4}$ S., to pass east of the Fog rock, until the west side of Nob point comes open east of Limestone point bearing N. $\frac{1}{4}$ W., when steer up within 2 cables of either shore, or in mid-channel. If bound to Stamp harbour, after entering Alberni inlet keep in mid-channel, except when passing through the First and Second narrows, and anchor on the eastern side of the harbour with the bearings already given.

After entering Alberni inlet, a strong southerly wind will generally be experienced, blowing home to the head; it, however, usually falls a little during the night.

If beating into the Eastern channel (which should only be done by small or quick working vessels), when standing towards cape Beale, tack before the passage between Turn island and the main comes open of Leading bluff bearing N.N.E. Ship islet may be approached to within a quarter of a mile; when nearing King island, or the Channel rocks, tack when Turn island becomes shut in with Leading bluff. As a rule, in standing towards the east shore do not approach within 2 cables, and after passing the Channel rocks, keep outside of the line of Deer islands. On nearing Leading bluff and Fog rock, keep Hill island open of the former

* It is high water, full and change, in Stamp harbour, at 0h.; springs rise 12 feet.

† *See* View B. on Admiralty chart, No. 584.

bearing S.W. ¾ S., till Nob point comes well open of Limestone point N. ¼ W., which clears the Fog rock to the south and north-east; when standing into Numukamis bay, give Reef and San José islands a berth of about 2 cables, after which the shore on either side may be approached to about one cable, except near the centre of Numukamis bay, which should not be approached closer than half a mile.

Anchorages.—If necessary to anchor, Entrance anchorage in the Deer group, just north of Helby island, is recommended, being secure, and easy of access from either Eastern or Middle channels. Kelp, Sproat Christie, and Nahmint bays, also Green cove, are easy of access, and may be used as stopping places.

MIDDLE CHANNEL, the largest passage into Barclay sound, is adjacent to the Eastern channel, and separated from it by the Deer islands. It is upwards of 12 miles long in a north-north-east direction and 3 miles wide in the narrowest part, being bounded on either side by numerous small islands and rocks. The depths within it vary from 30 to 54 fathoms, and off its entrance are three dangers, viz., Western reef, Channel reef, and Danger rock, which only break in heavy weather, and require great caution to avoid. In southerly or south-westerly gales there is generally a very heavy sea in this channel.

Danger rock, in the south-east part of entrance to Middle channel, 3½ miles W. ½ N. from cape Beale, and 2½ miles S.W. by W. ½ W. from Ship islet, is of small extent, and the sea only breaks on it in heavy weather. There are from 22 to 40 fathoms at a distance of 2 cables around it.

Leading marks.—Swiss Boy island just open west of Entrance island bearing N.N.E. (northerly) leads half a mile east of Danger rock; Mark islet open north of Ragged islet bearing N.E. leads three-quarters of a mile west of it, and the same distance east of Channel reef;* and Bail rock in sight west of Storm island bearing N.W. by W. ½ W. leads south of it and Channel reef.

Channel reef lies near the centre of the entrance to Middle channel, 3½ miles W. ¾ S. from Ship islet, and 1½ miles W.N.W. from Danger rock. It is about one cable in extent, uncovers at low water, and has 27 fathoms close-to on the eastern side; there are from 19 to 50 fathoms in the channel between it and Danger rock, and the same marks clear both of them.

Western reef lies in the south-west part of entrance to Middle channel, 5½ miles W. ¾ S. from Ship islet, and one mile south of the Broken group. It is about one cable in extent, awash at low water, and should not be approached within half a mile.

* *See* View C. on Admiralty chart, No. 584.

In bad weather the sea breaks heavily over all these reefs.

Entrance island, at the south-east point of Middle channel, and nearly one mile W.N.W. from Ship islet, is of small extent, and wooded; the tops of the trees being 350 feet above high water. It is steep-to and cliffy on the south and west sides; one-quarter of a mile north-east of it is a small islet and some off-lying rocks.

Hecate passage, leading into the Middle channel between Entrance island and Danger rock, is 2 miles wide, with depths of from 53 to 74 fathoms, and is the best way to enter Middle channel in thick weather, or from the southward or eastward.

Shark pass, between Entrance and Ship islands, is two-thirds of a mile wide, with from 14 to 25 fathoms in the middle, and may be used by steamers, or sailing vessels with a fair wind.

Dodger cove.—Between Lion and King islands are two small islands (Hains and Seppings) connected to each other by a reef. Dodger cove, on the east side of Middle channel, is situated between these islands and Diana island, and is a narrow creek about two-thirds of a mile long and one cable wide, with several rocks and small islets off its entrance. It affords good shelter to coasters or small craft at its head, where are from $2\frac{1}{2}$ to 3 fathoms water, but it should not be attempted by a stranger, as the entrance along the south side of Diana island is rather intricate.*

Ragged islet, a quarter of a mile west of Helby island on the east side of the channel, is rocky and of small extent, with a few trees on its summit; the west side may be approached to within a distance of about 2 cables, but it is connected to Helby island by a ridge of rocks, and no vessel should attempt to go through.

SATELLITE PASS, 3 miles from Entrance island, lies between Helby and Hill islands, connecting the Eastern and Middle channels. It is about one mile long and half a mile wide; the depths in the middle varying from 9 to 22 fathoms, and the south side is clear of danger, but 3 cables south of Hill island on the north side of the pass is a shoal patch of $3\frac{1}{2}$ fathoms, marked by kelp; Leading bluff open of east side of Hill island bearing N.E. by N. leads to the south-east of this shoal.

A vessel bound to Alberni inlet, after having entered Middle channel, should proceed through this pass into the Eastern channel and on to the inlet through the latter, keeping about one or 2 cables north of Ragged, Helby, and Wizard islands.

Village rocks, lying on the east side of Middle channel, 6 miles from Entrance island, and one-third of a mile from the north-west point

* Dodger cove is frequented between January and July, especially in bad weather, by the vessels engaged in the seal fishery.

of Robbers island, are 2 cables in extent, nearly awash at low water, and the sea usually breaks on them in heavy weather; they should not be approached within a quarter of a mile. Between Robbers and Tzaartoos islands is a small landlocked basin about 2 cables in extent (page 277), with from 5 to 7 fathoms, but the entrance to it from the Middle channel, though deep, is very intricate.

Chain islands, on the east side of Middle channel, are a chain of small islets and rocks nearly 4 miles long in a northerly direction. They lie parallel to the west side of Tzaartoos island, being separated from it by a passage three-quarters of a mile wide, but filled with rocks, and through which no vessel should attempt to pass.

Swiss-boy island, the southernmost of this group, is small and cliffy. Bull rock 2 cables west of it is of small extent, and has less than 2 fathoms water on it, which breaks in bad weather.

Caution.—A vessel should not approach the west side of these islands within half a mile, except when rounding their north part.

JUNCTION PASSAGE, at the north-east part of Middle channel, connecting it with Alberni inlet and Eastern channel, lies north of the Chain and Tzaartoos islands between them and the main. It is 2 miles long in an easterly direction, about one-third of a mile wide, its shores are clear of danger; the depths in mid-channel varying from 50 to 84 fathoms. On the north side of the passage is Rainy bay, about 1½ miles in extent; but there are several rocks and small islets within it, the shores are rugged and broken, and the water too deep to afford anchorage. Northward of this bay, and connected to it by a very narrow boat pass, is Useless arm, a large sheet of water with from 9 to 20 fathoms, not accessible to vessels.

Broken group, which forms the boundary of Middle channel along the west side, is composed of a number of small islands and rocks, covering a space upwards of 6 miles long and 4 wide. They are low and the principal ones wooded, the largest being about one mile in extent; there are several passages through them, and a good anchorage (Island harbour), in their north-east part, but as a rule no stranger should venture among them or approach within half a mile, as the depths are irregular, and other rocks may exist besides those known.

Redonda, the south-east island of this group, lies at the south-west entrance point of Middle channel, 4½ miles W. ½ N. from Ship islet. It is small, wooded, and of a round shape; some rocks extend 3 cables off its south-east point, and half a mile E.N.E. of it is a reef which covers at half-flood. Between Redonda island and Channel reef is a passage one

mile wide, with from 19 to 33 fathoms, but it should not be attempted by a stranger.

Village island, the largest of the group, is 1¼ miles north of Redonda, and upwards of one mile in extent; the east side is bold and cliffy, with 24 fathoms at one cable's distance. On its north side is a village of considerable size, where landing may be effected in almost all weather. Off its west side are several rocks, and a small bay, where a vessel may anchor in from 7 to 10 fathoms, but it is difficult of access.

Coaster channel, which runs in a westerly direction through Broken group, north of Village island, is about 4 miles long, and from half a mile to one mile wide, and has depths of from 10 to 24 fathoms in it; but as there are several rocks within it, this channel should not be attempted by a stranger.

A sunken rock lies in Coaster channel 3 cables N.W. ¼ N. from the north end of Grassy island.*

Village reef, in the east part of Coaster channel, half a mile north of Village island, is small, and 4 feet above high water; there is a depth of 34 fathoms at 3 cables east of it.

ISLAND HARBOUR,† formed by several rocks and islands, in the north-east part of Broken group, viz., Protection island on the east, Puzzle and Gibraltar islands on the north, and Mullins and Keith islands, on the west, is 5 miles from the entrance to Middle channel; it is a good, well-sheltered anchorage, about half a mile in extent, with from 10 to 14 fathoms water; and there are two good passages into it from Middle channel.

Protection island, 250 to 300 feet high, off its east side, protecting it in that direction, is two-thirds of a mile long, narrow, and its shore is rugged and broken, but it may be approached to within a distance of one cable; there are two small bare islets one cable from its south shore, and almost connected to it at low water.

Observation islet, 30 feet high, and another small islet to the south of it, lie half a cable from the middle of the south side of Protection island.

Elbow island, 3 cables S.S.W. from Protection island, is 30 feet high, small and rugged, with a notch in the centre; there are a few trees on it, and the island is conspicuous from the southward.

Elbow rocks, which cover at two-thirds flood, lie 1½ cables N.N.E. from Elbow island, between it and Protection island, and are steep-to on all sides.

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* Mr. John Devereux.

† *See* plan of Island harbour on Admiralty chart, No. 584; scale, *m* = 6 inches.

Several small islets and reefs, some above water and some covering at one-third flood, lie in almost a straight line between Elbow island and the north-east point of Keith island; these with Elbow rocks form the western limit of the south entrance channel to the harbour.

Pinnace rock, 3 cables East of Elbow island, almost in the fairway of the South entrance, only breaks in heavy weather, and is dangerous to vessels entering the harbour by that passage.

Channel rock, in the middle of Harbour entrance, 4 cables from its east end, is of small extent, with only 9 feet on it at low water.

Directions.—Island harbour may be entered either by the South or by the Harbour entrance. The South entrance, between the Elbow rocks and Protection island, is 1½ cables wide at its south part, with from 8 to 14 fathoms water. Harbour entrance, along the north side of Protection island, between it and Gibraltar island, is nearly one mile long, with an average breadth of about 2 cables; the depths within it vary from 15 to 18 fathoms.

Entering the harbour by the South entrance, steer for the south-east point of Protection island, on a W. by N. bearing, to avoid Pinnace rock; if the Elbow rocks are covered, keep along the south side of Protection island, about half a cable distant, till past them, when steer to the westward for the anchorage, passing about one cable south of the islets off Protection island. Coming in through Harbour entrance, after entering it in mid-channel keep about half a cable from the north side of Protection island till clear of Channel rock.

No one should attempt to enter this harbour without the chart, unless thoroughly acquainted with the place; and it should only be entered by sailing vessels with a fair wind.

Anchorage.—The best anchorage is near the centre of the harbour, about 2 cables west of the north-west end of Protection island, in from 10 to 12 fathoms, protected from the northward and from the westward by Puzzle, Keith, and Mullins islands.

Tides.—It is high water at full and change in Island harbour at 12 hours; springs rise 12 feet.

Nettle island, the north-east island of Broken group, is nearly one mile in extent, steep-to off its north side, but east and west of it islets and rocks extend out half a mile.

Swale rock, at half a mile east of the east point of Nettle island, is a small bare rock 8 feet above high water, which is very conspicuous from the Middle channel, and marks the east entrance of Sechart channel.

SECHART CHANNEL, north of Broken group, between it and the main, connects the Western and Middle channels. It is a winding channel 5 miles long in a westerly direction, and about half a mile wide; the depths in it varying from 16 to 35 fathoms, and a mid-channel course through is free of danger.

A rock that only uncovers at low-water spring tides lies 2¼ cables S.W. ¾ S. from Sechart village, and 1½ cables N.W. ¾ N. from the westernmost of the Hundred islands.*

Capstan island, 3 miles from the east entrance and nearly in the middle of this channel, is small, and the southernmost of a number of small islands extending nearly one mile from the north shore; a rock lies half a cable south of it, but the island may be rounded at one-quarter of a mile. Westward of these islets is the extensive village of Sechart, off which a vessel may anchor one-quarter of a mile from the shore in 14 fathoms, open however to the south-west.

Northward of Sechart channel the west side of Middle channel is bounded by two narrow islands about 2 miles in length, and separated from the mainland by a narrow boat pass; they should not be approached nearer than half a mile.

Bird islets, two small, bare, conspicuous rocks, lie almost in the centre of the north part of Middle channel, 9 miles from the entrance; the southern islet is 35 feet, and the northern 30 feet above high water; some rocks, which cover, extend one cable north and west of them.

EFFINGHAM INLET, the entrance to which is in the north-west part of Middle channel, is narrow, and about 8 miles long in a curved direction to the north-west, terminating in a low swamp; its shores on both sides are high and rocky, the western being indented by several bays. The depths in it vary from 35 to more than 70 fathoms, and there is no anchorage; off its south entrance point are some small islets and rocks extending one mile to the eastward.

A sunken rock lies 3½ cables N.E. ¼ E. from the north end of Webster island, and nearly one cable distant from the east shore of Effingham inlet.

Vernon bay, one mile east of Effingham inlet, at the head of Middle channel, is upwards of one mile in extent, open to the southward, and too deep to afford anchorage; its shores are high and rocky.

Edward rock.—At 3 cables S.E. from Palmer point, the south-west extreme of Vernon bay, is Edward rock, 3 feet above high water, and 2 cables off the east shore of the bay; just within the entrance is a reef awash at high water.

* Mr. John Devereux.

The north shore of Middle channel is rocky and bold, rising in some places to mountains upwards of 3,000 feet high; it is steep-to and clear of danger; in southerly winds the sea breaks violently along it.

Directions.—Entering Barclay sound by the Middle channel with a fair wind, and coming from the west or south-west, keep well clear of the western part of the sound, and 3 miles south of Broken group. Steer towards Ship islet on an E.N.E. bearing, until Mark islet comes open north of Ragged islet bearing N.E.,* when haul into the Middle channel with that mark on, which will lead midway between Channel reef and Danger rock; when Ship islet bears E. by N. the vessel will be north of these reefs, and may then steer up in mid-channel. If bound to Alberni inlet, a sailing vessel should proceed through Satellite pass into the Eastern channel, (as the wind is generally unsteady in Junction passage,) proceeding as before directed (*see* pp. 280, 282) for the latter channel. Should it, however, be requisite to go through Junction passage, give the Chain islands a berth of nearly half a mile to avoid the rocks off them, and proceed in mid-channel through the passage into Alberni inlet.

Unless intending to go through Satellite pass, do not approach the Deer islands within half a mile.

If entering Middle channel from the eastward, or in thick weather and not able to see the marks for clearing the reefs, keep well out until Entrance island bears North, when steer through Hecate passage so as to pass 2 or 3 cables west of the island, which will lead well eastward of all danger, then proceed as above directed.

Beating into Middle channel, when south of Danger rock and Channel reef, keep Sail rock (which lies off the south-west side of Broken group, and is very conspicuous) open south of Storm island, the southernmost of the group, bearing N.W. by W. $\frac{3}{4}$ W., until Mark islet comes nearly in line with the south-east point of Hill island N.E. $\frac{1}{4}$ E., when, if standing to the westward, tack; in standing to the eastward avoid shutting in the passage between Hill island and Ragged islet, which should be kept well open; tacking when these latter marks are on will lead between Danger and Channel reefs, and clear of them; when Ship islet bears East, a vessel will be northward of them, and may stand over to within about half a mile of the Deer islands and one mile of Broken group. If bound to Alberni inlet, when able to lay through the Satellite pass do so, keeping nearer to its south shore, and beat up to the former through the Eastern channel. No vessel should attempt to beat through Middle channel unless the weather be clear and the marks well made out.

A vessel may go between Entrance island and Danger rock, to the northward of the latter and Channel reef, by keeping Sea-bird islet

* *See* view C. on Admiralty chart, No. 584.

at the entrance of Pachena bay, well shut in by cape Beale bearing E. by S. $\frac{3}{4}$ S.

WESTERN CHANNEL, leading into Barclay sound westward of the Broken group, between it and Great bank, is about 4 miles long in a northerly direction, and from one to 2 miles broad, and except in the vicinity of Broken group it is clear of danger, the depths varying from 20 to 35 fathoms.

Sail rock, lying off the south-west part of Broken group, is a bare rock like a sail, rising 100 feet above the sea, and very conspicuous; to the northward of it are some low islets and rocks extending from the south-west island of the group; and on the east side of the Western channel foul ground projects in some places as far as half a mile off the west side of the group.

Black rock, at the south-west entrance point of the Western channel, $3\frac{1}{3}$ miles S.W. by W. $\frac{1}{2}$ W. from Sail rock, is 10 feet above high water, and small; some rocks which break extend 2 cables east of it.

Great Bear islet, 30 feet high, lies $1\frac{1}{2}$ miles N.N.E. from Black rock; about half a cable off its east end there is a rock awash.

Channel rock at the south-east extreme of the Great bank, on the west side of the Western channel, is 15 feet above high water, bare, and steep-to on its eastern side.

Great Bank is, within the 10-fathom edge, $2\frac{1}{3}$ miles long in a northerly direction, and its greatest breadth is $1\frac{1}{2}$ miles; on the shoalest parts, near the north and south-west ends, are from 3 to 4 fathoms, marked by kelp, over which in heavy gales the sea breaks.

Shag rock, 8 feet above high water, on the east side of the channel, $2\frac{3}{4}$ miles N. $\frac{3}{4}$ W. from Sail rock, and half a mile west of the Broken group, is small and bare, and foul ground exists one cable from it.

Round island, near the middle of the north part of the channel, $3\frac{1}{4}$ miles N. by W. from Sail rock, is small, but 200 feet high.

Beacon.—A beacon has been erected near the summit of Round island. The structure is conical in shape, 40 feet high, and whitewashed; and is surmounted by a mast and spire 15 feet high, and 155 feet above high-water mark.

Gowland, Table, and Castle islets, at the northern termination of Western channel, are small, but steep-to on their south sides. At 2 cables north-west of Table islet is a rock, awash at high water, and half a mile north-east from it is a patch 3 cables in extent, with from 4 to 7 fathoms; the best passage into Toquart harbour appears to be to the

eastward of these islets. A rock which dries 9 feet lies about three-quarters of a cable eastward of Gowlland islet.

Beacon.—A beacon consisting of a whitewashed wooden conical-shaped structure 40 feet high, surmounted by a mast and triangle 10 feet high, stands on the summit of Castle islet. The beacon is 94 feet above high-water mark.

Directions.—The Western channel, though clear of danger and wide, should only be used by steamers, or sailing vessels with a fair wind, and not then unless bound to Toquart harbour, in the north-western part of Barclay sound. When entering, give the Sail and Black rocks a berth of half a mile, and steer up in mid-channel, passing half a mile west of Round island.

Leading mark.—Keep the beacon on Castle islet well open to westward of that on Round island, bearing North, which will lead between the reefs three-quarters of a mile clear of all danger.

PEACOCK CHANNEL lies through the north-west part of Broken group in a north-east direction from the Western to Sechart channel. It is about 3 miles long, and nearly one mile wide, with depths of from 20 to 30 fathoms.

A rock lies nearly in the centre of the channel midway between Dodd and Pender islands. It has 4 feet water on it, and lies $4\frac{1}{2}$ cables S. by W. $\frac{3}{4}$ W. from south end of Pender island.*

Galley rock, on the east side of Peacock channel $1\frac{3}{4}$ miles within the west entrance, and 2 cables west of Puzzle island, uncovers at low water, and has 22 fathoms one cable south-west of it. Peacock channel is fit for steamers, or sailing vessels with a fair wind; the only caution required in navigating it is to keep the north shore aboard till past Galley rock.

Hand island, the north-west island of the Broken group, and at the south-west entrance point of Sechart channel, is small and rugged; foul ground exists off its east and west sides, which should not be approached within 3 cables.

Lyall point, at the north-west extreme of Sechart channel, on the mainland, and one mile N.W. by N. from Hand island, is a low, sharp point, with a sandy beach round it; there is a depth of 18 fathoms within one cable of it.

MAYNE BAY, northward of Lyall point, is of an oblong shape, 2 miles long and one mile deep. Its shores, except near the north part, are low and steep-to, the depths in it vary from 20 to 25 fathoms, and there is no anchorage except in its south-east corner, where there is a limited area with 14 fathoms at about 2 cables off shore.

* Mr. John Devereux.

The Sisters, a group of small islets, extending 5 cables southward of the north-west point of Mayne bay, may be approached to one cable.

Stopper islands, lying half a mile west of Mayne bay, are about 1½ miles in extent, wooded, and 200 feet high; the rocks extend from 2 to 3 cables off their east and west sides.

Larkins island lies close off their west side; a reef awash at high water extends 2½ cables N.N.W. from its north end.

St. Ines Island lies to the southward of Stopper islands, 1⅛ miles W.S.W. from Lyall point.

David channel, leading into Toquart harbour between Mayne bay and the Stopper islands, is about 2 miles long in a northerly direction, 3 cables wide in its narrowest part, and the depths in it vary from 17 to 22 fathoms.

Richard rock, on its west side, 4 cables from the Stopper islands, is steep-to on the east side, and may be approached to within one cable's distance; a vessel should not pass between this rock and the islands.

Hermit islet, 3 cables north of the Stopper islands, at the north-west point of David channel, is low, with 20 fathoms close-to; at 2 cables N.W. by W. from it is a small rock, 2 feet above high water.

TOQUART HARBOUR, in the north-west corner of Barclay sound, 9 miles from the entrance of Western channel, is about 1½ miles in extent, and well sheltered from all winds by the Stopper islands. Its shores are low and steep-to, except from the head, where Black patch, a shoal with 9 feet on its outer part, extends out nearly half a mile.

Image island, lying 3 cables off shore in the north-east part of the harbour, is small, and may be approached pretty close; to the north-west of it is an excellent anchorage in from 11 to 12 fathoms.

Village passage leads into the harbour westward of Stopper islands; it is upwards of one mile long, and 3 cables wide in its narrowest part, clear in mid-channel, with from 15 to 21 fathoms; some rocks awash at high water lie on its east side, extending 2½ cables N.N.W. from the north end of Larkins island.

Pipestem inlet, a long narrow inlet extending upwards of 5 miles nearly straight in a north-easterly direction from the north-east part of Toquart harbour, has depths of 19 to 37 fathoms, but affords no anchorage whatever; its shores are rocky, and rise abruptly to 1,000 and 2,000 feet above the sea; at its head is a small patch of swampy ground, some fresh-water streams flowing through it.

Rock.—A rock awash at low-water spring tides, with 10 to 14 fathoms close to it, lies in the approach to Toquart harbour; it is situated between Table island and Gowlland islet

Directions.—Entering Toquart harbour by David channel, after passing Lyall point, steer well into Mayne bay to avoid Richard rock; when Hermit islet comes open of the Stopper islands bearing N.W. ¼ W. a vessel will be clear eastward of it, and may steer for the harbour, passing midway between the Sisters and Stopper islands, and eastward of Hermit islet; anchor in 14 fathoms, with Image island bearing N.E. by N., and Hermit islet S.E., or proceed farther north, keeping one cable off the west side of Image island, and anchor north-west of it in 11 or 12 fathoms. Entering by Village passage, keep in mid-channel, or well over to the west shore, to avoid the rocks off the Stopper islands.

Anchorage.—The anchorage is of considerable extent, in from 12 to 14 fathoms, muddy bottom.

The west coast of Barclay sound from Toquart harbour to Ucluelet arm trends nearly straight to S.S.W., and rises gradually to high land 2,000 feet above the sea.

Forbes island.—For 2½ miles from the Stopper islands a chain of small islands lie parallel to the coast at a distance of about three-quarters of a mile off, with from 5 to 11 fathoms between them and the shore. Forbes island, the southernmost of them, is moderately high, steep-to on its south side; nearly one mile south-west from it, and extending from the opposite shore, are a number of rocks above high water.

SHIP CHANNEL, between the Vancouver shore and the Great bank southward of Forbes island, leads into the Ucluelet arm, and is clear of danger. It is 4 miles long N.N.E. and S.S.W., two-thirds of a mile broad in its narrowest part, the depth varying from 26 to 38 fathoms.

Double island, at its south-east point, is of small extent, steep-to on the west side, but from the south and east sides foul ground extends upwards of half a mile.

Kelp islet, 6 cables north-west of Double island, on the opposite side of the channel, is low and bare; kelp extends 2 cables south of it, and there are 38 fathoms midway between it and Double island.

UGLY CHANNEL, to the eastward of Shelter islands, connects Ship channel with the ocean. It is bounded on both sides by rocks and reefs, and though probably deep, it has not been sufficiently examined to recommend its being used by a stranger; the depths in the north part vary from 28 to 36 fathoms.

Starlight reefs, at its south-east part, are a cluster of rocks about 7 cables in extent, some above high water: in bad weather the sea breaks heavily over them.

Look-out island, on the west side of Ugly channel, is well wooded, of small extent, and about 150 feet high; at 3 cables south of it is

Humphries reef, a patch of rocks 2 cables in extent, and 6 cables north of it lies a bare rock 6 feet above high water.

UCLUELET ARM, just within the south-west entrance point of Barclay sound, is a narrow inlet extending 5½ miles in a N.W. by W. direction, parallel to the outer coast, and separated from it only by a narrow peninsula. Its south shore is low, and indented by several small creeks and bays; the northern shore is nearly straight, and, at a short distance inland, rises gradually to a flat-top range of considerable height, the south-east shoulder of which, mount Ozzard, 2,270 feet high, is conspicuous from the south-east.

The depths in this arm vary from 4 to 8 fathoms, and there is secure and well-sheltered anchorage from one mile inside the entrance to the head.

Shelter islands, upwards of half a mile south-east of the entrance of the Ucluelet arm, are an irregular cluster of small islets and rocks about one mile long in a north-westerly direction, and 3 cables wide, which completely shelter the arm from the sea; at one cable's distance from their north and west sides are from 7 to 15 fathoms.

Centre reef, 3 cables westward of their northern part, is of small extent, and about 3 feet above high water.

Alpha passage, between Centre reef and Shelter islands, is 2 cables wide in its narrowest part, with depths of from 11 to 14 fathoms. There is, however, said to be a sunken rock* in this passage, and it should therefore not be used by steamers or coasting vessels bound to the Ucluelet arm, except from necessity.

Carolina channel, west of Centre reef, between it and Amphitrite point, the south-west point of entrance to Barclay sound, is the western-most passage into the latter and the Ucluelet arm. It is nearly straight, one mile long in an E.N.E. direction, and one-quarter of a mile wide in its narrowest part, with depths of from 11 to 15 fathoms. This channel appears to be the best for a stranger to use if entering the Ucluelet arm from seaward, but in heavy weather, when there is a long swell from seaward rolling in, the entrance often appears to be an unbroken line of surf.

Round island, at the north part of this channel, is the south entrance point to the Ucluelet arm; it lies nearly one mile E.N.E. from Amphitrite point, is high, and is connected by a sandy beach at low water to the mainland; the east side is steep-to, and may be approached to within one cable; at 4 cables east from it, on the opposite side of the entrance, rocks awash at high water extend one cable off the north shore.

Leading point, on the south side of Ucluelet arm, 6 cables within the entrance, is bold, steep-to, and may be approached to within a distance of 50 yards; between it and Round island is a narrow creek, with

* Navigating Lieutenant, E. S. Clapp, H.M.S. *Scout*, 1872.

2 fathoms water, but the entrance is blocked up by kelp. At Leading point the breadth of the inlet contracts to one cable.

Stewart bay, on the north side, half a mile within the entrance, is 2 cables deep, and half a mile wide. In its centre is a rock awash at high water, and the bay is too shallow to afford anchorage except to a coaster; there is a native village of considerable size in its west part, off which some small rocks extend about half a cable.

Channel islet, in the middle of the arm about 2 miles within the entrance, and one mile past Leading point, is small; between it and the latter is good anchorage in from 6 to 9 fathoms. There is a clear passage north of the islet with 7 fathoms water, but only 2 fathoms on its south side; at 2 cables N.W. by W. from the islet lies a small rock above high water, steep-to on all sides, except the south-east, from which a shoal with 2¼ fathoms water extends for one cable.

Anchorage.—To the westward of Channel islet the arm becomes wider, affording good anchorage in 4 to 7 fathoms, over a space one mile long and half a mile wide.

Staples island, half a mile from the head on the south side of the arm, and connected to the latter at low water, is about one mile in circumference, and low; there is no anchorage, except for small craft, to the westward of it.

A sandy beach borders the north shore of Ucluelet arm from its head to Stewart bay.

Directions.—Several channels lead into Ucluelet arm, with apparently deep water through them, but there are so many rocks and dangers in their vicinity that great vigilance is recommended, and it would hardly be advisable to enter without a pilot; should it, however, be necessary to do so, a vessel should steer for Amphitrite point, the south-west extreme of Barclay sound, and when about 2 cables from it, proceed to the eastward through the Carolina channel, keeping about 2 cables off its west shore to avoid Centre reef. Pass Round island at the distance of one cable, and rounding it sharply steer about W.N.W up the arm, keeping well over to the south shore; pass Leading point within half a cable to avoid the rocks abreast of it on the north side, and anchor midway between it and Channel islet, in 6 to 9 fathoms; or proceed farther to the westward, where a more extended anchorage will be found, taking care to pass north of Channel islet.

Channel islet kept open between the sides of the inlet bearing N.W. by W. ¼ W. leads into Ucluelet arm from the eastward off the entrance of the Western channel, to the northward of the Shelter islands, and between the Great Bear and Sykes reef to the eastward and Black rocks, Starlight, and Haddington reefs to the westward; but as this channel has not been closely examined, it should be used with great caution.

Entering the arm from the northward through Ship channel, keep about half a mile off the west shore, and passing about 2 cables north of Shelter islands, steer up the arm as before directed.

The COAST* from Amphitrite point takes a W. by N. direction for 17 miles to point Cox; it is low and indented by two large sandy bays, which afford no shelter; at a distance of 4 miles from it are depths of from 20 to 27 fathoms.

Wreck bay, 4 miles westward of Amphitrite point, is nearly 3 miles wide, and one mile deep, with a small islet in the centre; there are several rocks in the bay, and it is totally unfit for anchorage.†

Long bay, 8 miles westward of Amphitrite point, is 7 miles wide and upwards of one mile deep, with from 8 to 11 fathoms between the entrance points; there are several rocks in it, and no vessel should anchor here; at its south-east point, just within the reefs, good shelter for boats will be found in all weather.

Schooner cove, in the north-west part of the bay, is of small extent, with 2 fathoms water inside; it would afford good shelter to a coaster or small vessel.

Portland point, the north-west extreme of Long bay, is high and abrupt, with some small rocks and islets around it, at a distance of half a mile.

Gowlland rocks, 1¼ miles W.S.W. from Portland point, are of small extent, bare, and from 10 to 15 feet above high water; they should not be approached nearer than one mile.

Caution.—When navigating between Barclay and Clayoquot sounds do not approach the shore within 2 miles, nor stand within one mile of the entrance to Wreck and Long bays.

CLAYOQUOT SOUND comprises a number of inlets, islands, and rocks, covering an area 30 miles long in a westerly direction, and 16 broad. The entrance to it is fringed by numerous dangerous rocks, which require due caution to avoid; it lies between Cox and Sharp points, bearing from each other W. by N. ¾ N. 21 miles, and is distant 20 miles W. by N. from Barclay sound, and 66 miles W.N.W. from the light-house on Tatoosh island.

There are several channels into the inner waters of this sound, but with the exception of Ship channel they should not be attempted by a stranger.

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* *See* Admiralty chart: Sydney inlet to Natinat, No. 584; scale, *m* = ·05 of inch.

† A Peruvian vessel, the *Florentia*, was wrecked here in December 1860.

The soundings at a distance of one mile outside the outer rocks vary from 20 to 30 fathoms, but in the channels and inside the bottom is irregular.

Tides.—It is high water, full and change, in Clayoquot sound at 12 hours, the rise and fall being about 12 feet.

Point Cox, at the south-east extreme of Clayoquot sound, is rocky and may be approached to within a distance of half a mile; Vargas cone, a remarkable summit, 432 feet high, rises just within the point, and is very conspicuous from the westward.

Templar channel, the eastern entrance to the sound between Low peninsula on the east, and Lennard, Wakennenish, and Stubbs islands on the west, is a winding passage about 4 miles long in a N.N.W. direction, with an average breadth of half a mile. The soundings vary from 8 to 10 fathoms in its entrance, to 3¼ fathoms in its shoalest part near the north end, and a shoal bank lies in the middle abreast Wakennenish island; in heavy weather the sea breaks right across the channel. No vessel drawing more than 12 feet water should attempt to enter the sound by this channel, and not even then without a pilot, as it is very intricate, and no directions can be given; coasters, however, generally use it.

False bay, just northward of Cox point at the south-east extreme of the channel, is about half a mile in extent, with from 3 to 4 fathoms water, but open to the south-west, and unfit for anchorage; its shores are low and sandy.

Lennard island, 1½ miles W. by N. from Cox point, is of small extent and wooded, steep-to on the east side, but west of it are some rocks and small islets.

Wakennenish island, on the west side of the channel, one mile from Lennard island, is about 200 feet high, 1½ miles long, and half a mile wide; at its south point is E cha chets, a large Indian village, generally occupied by the natives during the summer season when fishing.

Round island, at the north part of the channel, 4 miles N.W. from Cox point, is small, but with a clear but narrow passage on either side of it; a bank, dry at low water, extends 7 cables northward from it.

Stubbs island, 2 cables west from Round island, is about one mile in circumference, and has a sand-bank which dries at low water, extending one mile north from it.

BROKEN CHANNEL, between Wakennenish and Vargas islands, to the westward of the former, is upwards of 2 miles long in a northerly direction, and half a mile wide in its narrowest part, with

from 6 to 15 fathoms water; several rocks lie off its entrance, and on both sides; the tide runs through from 2 to 5 knots, and no vessel should use it without a pilot.

McKay reef, lying off the entrance, 4 miles W. by N. from Cox point, is of small extent, 5 to 10 feet above high water, and the sea generally breaks heavily over it.

Passage rock, which covers at high water, lies two-thirds of a mile north of McKay reef.

VARGAS ISLAND, on the west side of Broken channel, is 4½ miles long, and 4¼ miles wide at its broadest part, and its surface is low and undulating; on the eastern side near the middle is Kelsemart, a native village.

The Rugged group, at half a mile from the south shore, running parallel to it, is a chain of small islets and rocks.

Open bay, on the west side of Vargas, is about one mile in extent with from 6 to 7 fathoms water, and apparently a clear passage into it from the north-west, which has not, however, been examined.

Blunden and Bare islands, to the westward of Open bay, are of small size; numerous reefs are scattered about this locality.

SHIP CHANNEL, to the westward of Vargas island, between it and a number of small islands and rocks, is the only passage into Clayoquot sound which should be attempted by a stranger. Its entrance lies nearly 11 miles westward of Cox point, and the channel is 5 miles long in a N.N.E. direction, with a breadth varying from three-quarters to 1½ miles. The depths in the south part vary from 20 to 22 fathoms, decreasing to 5½ fathoms in the shoalest part near the north end; the tide sets through it at from one to 2 knots.

Bare island, at the south-east entrance point of the channel, is small, rising to a summit 40 feet high in the centre, and forms a good mark for identifying Ship channel; a rock on which the sea breaks lies 5 cables E. by S. from it, but there are 20 fathoms within half a mile of its south-west side.

Plover reefs, on the east side of the channel half a mile north-west from Bare island, are of considerable extent, stretching one mile from the west side of Blunden island; some parts are 6 feet above high water, and there are 5 fathoms at 2 cables west of them.

Hobbs and Burgess islets lie at the north-east part of the channel, 2 cables from the west side of Vargas island, and nearly connected with it at low water; they are small, and may be approached to within a distance of 2 cables, where are depths of from 7 to 8 fathoms.

Sea Otter rock lies at the south-west entrance point of Ship channel, 2 miles W. by N. from Bare islet; it is very small, only 6 feet above high water, and there are 5 fathoms close-to, off its east side.

Shark reefs, some of which cover, others 6 and 10 feet above high water, lie on the west side, 2 miles N.E. ½ N. from Sea Otter rock; they are about 3 cables in extent, and should not be approached nearer than 2 cables on their south and east sides; between them and Sea Otter rock there are from 14 to 24 fathoms.

Lawrence islands, on the west side, 2¾ miles from Sea Otter rock, are small, low, and wooded, but steep-to on the east side.

Bartlett island, half a mile to the westward of the Lawrence islands, is low and wooded; its shores are much broken, and a number of rocks extend from one-quarter to half a mile on all sides of it, and the island should not be approached within the latter distance.

Twins islets, at the north-west point of Ship channel, 4 miles from Sea Otter rock, are low, but wooded, and connected at low water; kelp extends one cable south of them.

HECATE PASSAGE, to the north-east of and connecting Ship channel with the inner waters of Clayoquot sound, is 3 miles long in an E.N.E. direction between Vargas island and the main shore of Vancouver, and upwards of one mile wide; there are several rocks on both its shores, and a sand-bank in its centre, but to the southward of the bank along the north shore of Vargas is a clear passage with not less than 5½ fathoms.

Half-tide rock, off the south-west point of Hecate passage and 2 cables from Vargas island, is of small extent, covers at half flood, and may be approached to one cable on the outside. Hobbs islet open west of Burgess islet bearing S. by W. ¼ W. leads 2 cables west of it; and the Twins in line with the north-west Whaler island bearing W. by S. leads 2 cables north of it, and south of North bank.

North bank, lying in the centre of the passage, is of considerable extent, composed of sand, and has 5 feet water on its shoalest part; there are 4 to 5 fathoms north of it, but the passage south is the best; the Twins in line with the north Whaler island bearing W. by S. leads 2 cables south of it, in the deepest water.

White islet, to the north-west of the North bank and one mile from the south-west point of Hecate passage, is small, bare, and conspicuous from the entrance of Ship channel; there are several rocks between it and the north shore.

The Cat-face mountains, rising on the main shore of Vancouver island, and fronting Ship channel, are a remarkable flat-top range nearly 3,000 feet high, with some patches of cliff and white bare rock in about the middle of their south side. They are very conspicuous from seaward.

Deep pass, between two islands at the north-east part of Hecate passage, is about 3 cables long and 1½ cables wide, with 9 fathoms water, and is the best channel leading from Hecate passage into the inner waters. The tide sets at the rate of from 2 to 3 knots through it.

HECATE BAY, 2 miles north from Deep pass, on the west shore, is 6 cables wide and 3 cables deep, with from 9 to 10 fathoms; it is clear of danger, and one of the best anchorages within the sound, being easy of access and well sheltered. There is a stream of fresh water in the middle of the bay, very convenient for watering.

Observatory islet, at its north point, is 35 feet high, and bare. Two cables north-east of it is a small rock, 2 feet above high water.

CYPRESS BAY, on the main shore of Vancouver, 4 miles north from Deep pass, is nearly 2 miles in extent, with from 12 to 26 fathoms over it. On the east and west sides the shores are low, but are high on the north. There is a large stream, with some swampy land, on its west side; on the east is Calm creek with a narrow entrance, to the southward of which are some off-lying rocks and small islands.

Mussel rock lies 4 cables off the east shore of the bay and half a mile N.N.W. ¾ W. from the east extreme. It is of small extent, and covers at three-quarters flood; half a cable north-west from it is a depth of 11 fathoms.

Calm creek, in the north-east part of Cypress bay, is 6 cables long in the same direction, with from 4 to 6 fathoms, but the entrance to it being narrow, with only 2 fathoms water, it is useless for anchorage, except to small craft.

Anchorage.—There is good anchorage in Cypress bay in 12 fathoms near its north part, at half a mile from the shore; and though it is open to the southward, no sea rises.

MEARES ISLAND, within the eastern part of Clayoquot sound, adjacent to and north-east of Vargas island, is 6 miles in extent in a northerly and " miles in an easterly direction. Its shores, except on the north side, are high and rugged, and there are several summits on the east and west sides upwards of 2,000 feet above the sea; one on the latter side, named Lone cone, an isolated conical mountain, is 2,325 feet high, and very conspicuous from seaward near the entrance of Ship channel.

An extensive inlet (Disappointment inlet) runs nearly through the island from the south side to north, and there are several other bights and bays.

Deception channel, a continuation of Broken channel to the northward, between Meares and Vargas islands, is about 3 miles long north and south, and half a mile wide, with irregular depths of from 5 to 20 fathoms. There are several rocks in its north-west part; and a large sand-bank, which partly dries at low water, extends from Vargas island along its west side for nearly two miles, reducing the deep part of the passage to about 3 cables. The tide sets at from 2 to 5 knots through this channel, and a stranger should not attempt its navigation.

RITCHIE BAY, on the north-west side of Meares island, 2 miles eastward of Deep pass, is one mile wide, half a mile deep, and affords anchorage in 5½ to 10 fathoms at 2 cables off its eastern shore. The shores of the bay are rocky, but have no outlying dangers; Robert point, its south-west extreme, slopes gradually to the sea, and may be approached to within a distance of one cable.

Yellow bank, which lies almost athwart the entrance of Ritchie bay, is about three-quarters of a mile in extent, and has 3 feet on the shoalest part; there is deep water around it, and the channel between it and Robert point is 2 cables wide, with from 6 to 10 fathoms.

Saranac island, near the north part of Ritchie bay, is about half a mile long in a northerly direction, and narrow; it is about 200 feet high, and wooded, steep-to on the east side; some small islets extend 3 cables off its west side, and there is a narrow but deep passage between it and Yellow bank; between the island and the north point of Ritchie bay are 30 fathoms in mid-channel.

Directions.—If wishing to anchor in Ritchie bay, and coming from Deep pass, proceed to the eastward so as to pass about one cable north of Robert point, and keeping the same distance off the south shore, steer into the bay, anchoring in 5 or 7 fathoms about 2 cables from its east side, with the extremes bearing North and S.W. ¾ W.; entering from the northward, steer midway between Saranac island and the north point of the bay.

The north shore of Meares island is low, nearly straight, and steep-to; it takes an E. by N. direction for nearly 4 miles, and then turns sharply to the south-east.

BEDWELL SOUND, the entrance to which is 1¼ miles East from Cypress bay and northward of Meares island, is 7 miles long in a northerly direction, and one mile broad till within 2 miles of its head, when it contracts to 3 cables; the shores are high and rugged, rising on the east side

to sharp jagged peaks from 2,000 to 4,400 feet above the sea. At its head is a small patch of low swampy land, and a valley from which the Bear river, a stream of considerable size, flows into the sound. The depths in the sound vary from 35 to 45 fathoms, and there is no anchorage whatever within it.

Race narrows, east of Bedwell sound, between the north side of Meares island and the main, are 1½ miles long, and about 2 cables wide in the narrowest part; the tides set through them at the rate of from 3 to 4 knots, the flood from the westward, and there are 10 fathoms in the shoalest part of mid-channel.

Ripple islets, off the east entrance to Race narrows, are about 20 feet high, small and covered with bushes; there are some strong tide rips around them, but they may be approached to within about one cable's distance.

Warn bay, to the eastward of Race narrows and one mile from the north-east part of Meares island, is upwards of 2 miles long in a northerly direction, and about three-quarters of a mile wide; the shores on both sides are high, but low at the head, from whence issue several streams, and a sand-bank dries out upwards of one cable. The depths in the bay are irregular, varying from 50 to 8 fathoms, but a vessel may anchor about 3 cables off shore near the west side of the head of the bay in 14 to 16 fathoms.

FORTUNE CHANNEL, between the east side of Meares island and the main, is 5 miles long, north and south, and varies in breadth from 3 cables to 1¼ miles; its shores are high, and there are several off-lying rocks on its west side near the middle; the depths in it vary from 30 to 75 fathoms.

The east shore of the channel from Warn bay to Deception pass is rocky, and indented by several small bays which afford no anchorage.

MOSQUITO HARBOUR, on the east side of Meares island, is narrow, and about 2 miles long in a north-westerly direction; there are several rocks and small islets off its entrance, but it affords good anchorage inside in from 4 to 7 fathoms; the entrance is 1½ cables wide, with 11 fathoms, and the harbour is easily entered by a steamer.

Plover point, at the south-east side of the entrance to Mosquito harbour, is rocky, with some small islets a short distance off it, and there are 20 fathoms one cable to the southward of it.

Hankin rock lies 2½ cables south-west of Plover point, and in the track of vessels entering Mosquito harbour; it is marked by kelp, and there are 23 fathoms midway between it and the point.

Wood islands, in the middle of the entrance, nearly half a mile west of Plover point, are small and extend in a northerly direction for half a mile; some rocks lie a short distance off their south part, but there is a clear passage into the harbour on both sides of them, with 7 fathoms water.

Blackberry islets, in the centre of the harbour and three-quarters of a mile from the entrance, are small, but steep-to, there being 4 fathoms within one cable of them.

Directions.—When entering Mosquito harbour, round Plover point at one cable's distance to avoid the Hankin rock, and keep midway between Wood islands and the east shore, anchoring in about 7 fathoms, one-third of a mile south of the Blackberry islets; a vessel may enter westward of the Wood islands by keeping midway between them and the shore.

Anchorage.—The best anchorage is a short distance to the southward of the Blackberry islets, in from 5 to 7 fathoms, northward of them are from 3 to 4 fathoms.

Dark island, 7 cables south of Plover point, on the west side of Fortune channel, is small; some rocks extend a short distance off its west side, but there is a clear passage between it and the west shore.

Double island, 5 cables south of Dark island, is small, and steep-to; there are 24 fathoms in the passage between it and Meares island.

DECEPTION PASS, at the south extreme of Fortune channel and connecting it with Tofino inlet and Browning passage, is a winding channel to the S.S.E., about 1½ miles long and 2 cables wide; it is free from danger in mid-channel, the depths vary from 10 to 20 fathoms, and the tide sets with considerable strength through it. On its west side is a narrow creek half a mile long with from 8 to 9 fathoms, and in the middle of the pass is a small islet.

TOFINO INLET, in the eastern part of Clayoquot sound, is about 10 miles long in a northerly direction, and varies in breadth from one-half to 1½ miles; its shores are high and rocky, indented on the west side by some large creeks; there are several islands in the inlet and along both shores, but none of any considerable size. The depths vary from 22 to 68 fathoms, and there is no anchorage, except near the entrance on the west side.

Indian island, on the south side of entrance, half a mile south-east from Deception pass, is about one mile in extent, and steep-to on the north side; a bank extends 2 cables from its west point, with 3¼ fathoms close to the edge.

Warn island, nearly one mile north from Indian island, on the west side of the inlet just within the entrance, is upwards of half a mile in extent, and steep-to on all sides.

Island cove, half a mile west of Warn island, is of small extent, with from 8 to 10 fathoms in the middle, and completely landlocked; a small island lies off the entrance, with a clear passage one cable wide on either side of it into the cove.

Gunner harbour, on the west side of the inlet, just north of Warn island, is 1½ miles long in a N.N.W. direction, but narrow; a small islet lies in its centre, about half a mile north of the entrance, and between them a vessel may find good anchorage in about 10 fathoms; the harbour becomes shoal towards the head.

Tranquil creek, on the west side of the inlet 4½ miles north from Warn island, is narrow, and upwards of one mile long; its shores are high and rocky, and the creek is too deep for anchorage.

Between Tranquil creek and Warn island, along the west shore, are several small rocky islets, extending from 2 to 3 cables off.

Flat-top islets, 5 miles from the entrance of the inlet and 2½ cables from its west shore, are steep-to on the east side, there being 47 fathoms at one cable's distance from them. Northward of these islets Tofino inlet takes a winding direction to the northward, narrowing gradually towards the head, and terminating in Deer creek, one mile long and a quarter of a mile broad, but it is too deep for anchorage, there being from 22 to 29 fathoms inside it.

On the east side of Tofino inlet, 4 miles from the entrance, is a stream of considerable size, said to communicate with an extensive lake.

Browning passage, on the south side of Meares island, connecting Tofino inlet with Templar channel, is 5 miles long in a westerly direction, and less than half a mile broad. Its east end is only 1½ cables wide, and off the west entrance there are several rocks, and no stranger, except with a small vessel, should attempt it. The depths in it vary from 4 to 12 fathoms, and the tide sets through at a rate of 2 to 4 knots, the flood stream from the westward.

NORTH CHANNEL, to the westward of Ship channel, and separated from it by a number of small islands and rocks, lies along the south-east side of Flores island in a north-easterly direction. It is 4 miles long, half a mile wide in the narrowest part, and the depths in it vary from 7 to 17 fathoms; both sides of the channel are bordered by innumerable rocks, and a stranger is not recommended to use it, as it has not been closely examined; the sea generally breaks heavily along both sides of its outer part.

FLORES ISLAND, in the western part of Clayoquot sound, between North channel and Sydney inlet, is nearly 7 miles in extent, and of a square shape; it is low on the south and east sides, but high on the north and west, rising in some places to 3,000 feet; the shores are rugged and broken, and there are several off-lying rocks along its south and west sides; as a rule its outer part should not be approached nearer than 2 miles.

Rafael point, the south extreme of Flores, is cliffy and of moderate height; some rocks extend 2 cables from it, and the point should not be rounded within half a mile. From thence the west coast of the island turns suddenly to the N.N.W., and continues in that direction for 7 miles, being indented by several small bays; some rocks and small islets extend 2 or 3 cables off in many parts.

SYDNEY INLET, at the west end of Clayoquot sound, is 10 miles long in a N.N.W. direction, and varies in breadth from a half to one mile. Its entrance is 3½ miles N.W. by N. from Rafael point, between the west side of Flores island and the main land of Vancouver; at 4 miles from the head are two small branches about 2 miles in length, one extending north the other south-west; the shores are high and rugged, rising abruptly from the sea to 2,000 and 3,000 feet. The depth in the entrance is 15 fathoms, increasing gradually towards the head, and there is no anchorage.

Sharp point, the south-west point of entrance to Sydney inlet and south-west extreme of Clayoquot sound, is low and rocky, but may be approached to one cable's distance.

REFUGE COVE,* just west of Sharp point, and separated from Sydney inlet by a narrow peninsula, extends 1½ miles in a N.N.W. direction, is from one to 2 cables wide, and affords good anchorage in 4 to 5 fathoms at half a mile within the entrance, well sheltered and secure from all winds, though apparently open to the S.S.E.

Sunken rock.—The entrance is narrow, and at 2 cables inside Sharp point and about one cable from the eastern shore is a rock having only 9 feet on it at low water. This rock lies slightly eastward of the fairway, but a good look out is necessary, as it is not always marked by kelp.

Canoe reef, lying just south-west from the entrance and three-quarters of a mile S.W. by W. from Sharp point, is 2 feet above high water, but steep-to on the south and west sides.

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* *See* plan of Refuge cove on Admiralty chart, No. 584; scale, $m = 3{\cdot}0$ inches.

Directions.—Entering Refuge cove from seaward, bring the entrance or Sharp point to bear N.N.W. ½ W., and steer for it, so as to pass one cable west of the point; then keep in mid-channel, or rather nearer the western shore, to avoid the 9 feet rock, having passed which keep close to the eastern shore and anchor in 4½ or 5 fathoms, about 7 or 8 cables within the entrance.

A sailing vessel, if embayed near this part of the coast, would find safety and shelter in Refuge cove.

SHELTER ARM branches off from the east side of Sydney inlet to the north-east, along the north side of Flores island for 5 miles, and then indents the mainland in a N.E. by N. direction for nearly the same distance, terminating in a narrow creek at the head. It is upwards of half a mile wide, 10 miles long, and the depths vary from 40 to 90 fathoms in the south part.

The shores of Shelter arm are high, precipitous, and steep-to; the tide runs from one to 2 knots through it, the flood stream from the westward.

Steamer cove is the only anchorage (indifferent) in it, just 2 miles within the entrance on the north side of Flores island; it is a small bight where a vessel may anchor in 17 to 19 fathoms, passing on either side of the islet at its entrance.

Obstruction island, on the east side of Shelter arm, and separated from the north point of Flores island by a narrow pass, is about 2 miles in extent and 700 feet high. Its shores are rocky and broken, and the passages along its south and east sides are blocked up with rocks. Rocky pass, on its south side, is narrow, about 1⅔ miles long, in an east and west direction, but filled with rocks, so that no vessel could get through it; the tide runs irregularly through, but seldom exceeds 4 knots.

North arm, between the east side of Flores island and the main, is about 8 miles long in a S.E. by S. direction, and nearly one mile broad. Its western shores are high, but decrease gradually to the southward; the depths are very great in the north part, but they shoal rapidly to the southward, where a vessel may anchor in from 5 to 8 fathoms abreast Base point.

Matilda creek, on the west side of North arm, abreast the entrance to Herbert arm, is 1¼ miles long in a S.S.E. direction, very narrow, with from 10 to 25 fathoms, but useless as an anchorage.

Base point, the south-west entrance point to North arm, is low and sandy, and there are from 2 to 3 fathoms at one cable's distance from it. A vessel may anchor in from 5 to 8 fathoms midway between this point and the east shore.

Herbert arm, the entrance to which is on the east side of North arm, about 2 miles from the south entrance of the latter, is 9 miles long, in a northerly direction, and its average breadth is about one mile. The shores are high, mountainous, and much broken; and there is no anchorage except at the south part of its entrance.

Cone island, lying at the entrance of this arm, is about one mile in extent, 1,090 feet high, and steep-to on the south and west sides, but the passage into Herbert arm north of it is blocked up by rocks and small islets; that south of it is nearly one mile wide, with depths of 26 to 50 fathoms in it.

Bawden bay, on the south side of entrance to Herbert arm, and about 1½ miles south-east of Cone island, is of small extent, and affords anchorage in 15 fathoms, near the centre; enter it in mid-channel.

White Pine cove, on the east side of Herbert arm, nearly 3 miles from the entrance, is small, with a bank extending from the head; a small vessel may anchor close to the edge of this bank in about 10 fathoms; care, however, should be taken to avoid a shoal of 3 fathoms lying almost in mid-channel, at about 7 cables from the head of the cove.

Directions.—Entering Clayoquot sound by Ship channel (which latter will easily be recognized by Bare island, Sea Otter rock, and a remarkable summit inland, the Lone cone*), round either Bare island or Sea Otter rock at the distance of half a mile, and steer up the channel with the south point of Lawrence island and the Twins islets in line with the north summit of the Cat-face mountains bearing N.N.E. ¼ E.* Keep the above-mentioned mark on till within half a mile of the Shark reefs, when haul more to the eastward for the west extreme of Vargas island, which may be rounded at a distance of 3 cables. If going on through Hecate passage (page 297) into Hecate bay, to clear Half-tide rock keep Hobbs islet open west of Burgess islet bearing S. by W. ¼ W. until the Twins come in line with the west Whaler island bearing W. by S., when steer up the passage with that mark on astern, which will lead north of Half-tide rock and south of the North bank. When past the latter, steer through Deep pass, and anchor in Hecate bay midway between its entrance points in 9 or 10 fathoms.

During heavy south-westerly gales the sea is said to break right across Ship channel, between Lawrence and Hobbs islands.

Although there are several apparently deep channels into Clayoquot sound, they are, with the exception of Ship channel, so tortuous, and filled with rocks, that no stranger should attempt to enter by any except the latter, and not by it unless having the latest Admiralty

* *See* View D. on Admiralty chart, No. 584.

chart of the sound. If the weather be clear, it will be easy to recognize Ship channel, but if in doubt, there will be little difficulty found in procuring a native off the entrance of sufficient intelligence to pilot a vessel in.

Intending to navigate the inner waters of the sound, which can only be done by a steamer or small craft, the chart will be found the best guide.

CHAPTER VIII.

WEST COAST OF VANCOUVER ISLAND, FROM CLAYOQUOT SOUND TO CAPE SCOTT.

VARIATION, 23° 45′ E. in 1888.

HESQUIAT HARBOUR,* 8 miles westward of the west part of Clayoquot sound, is formed at the bottom of the bay on the east side of Estevan point. It is 4 miles long in a N.N.W. direction, and upwards of 2 miles wide at the entrance, opening out a little inside, but on nearing the head it contracts to less than one mile. The depths within the harbour vary from 4 to 8 fathoms, and there is a good and secure anchorage in 7 or 8 fathoms at half a mile from the head.

The bar.—Across the entrance, between Hesquiat bluff and Estevan point, is a bar or ledge, about 3 cables wide, with from 3 to 5 fathoms water over it, which in a great measure prevents the sea from setting home into the harbour. Kelp grows more or less all over the anchorage in a depth of 5 fathoms.

Hesquiat bluff, the east entrance point of the harbour, is a remarkable, low, wooded point, with a shingle beach around it; a reef, which covers at a quarter flood, lies half a mile south-west from it.

Boat basin is a small cove with 4 fathoms at the head of Hesquiat harbour on the east side; there is a large fresh-water stream there, and vessels may obtain wood and water with great facility.

The shores of the harbour are mostly low and wooded, and within the entrance, at a distance of 2 cables, clear of danger. On the west side of the bay near Estevan point are several indications of coal, and the land is apparently fertile.

Tides.—It is high water, full and change, in Hesquiat harbour at 12h. 0m.; springs rise 12 feet.

Directions.—Hesquiat harbour is easy of access to sailing vessels, even with a foul wind. The notch of Leading mountain in line with the east entrance point, bearing N.N.W., leads over the bar in 4½ fathoms at low water. Entering either from the east, or west, give the outer shores

* *See* Admiralty chart, Esperanza to Clayoquot sound, No. 569; scale, *m* = 0·5 of an inch. Also plan of Hesquiat harbour on same chart; scale, *m* = 1·5 inches.

of the harbour a berth of more than half a mile, till past the bar, after which they may be approached to 2 cables; anchor in 7 or 8 fathoms near the centre of the harbour, about half a mile from its head.

In strong south or south-westerly gales the sea breaks heavily over the bar, but the anchorage is always safe, and landing is at all times practicable in Boat basin.

The natives though friendly are much inclined to pilfering, and should be carefully watched.

ESTEVAN POINT, 15 miles W. ¼ N. from Rafael point, and 92 miles W. by N. from cape Flattery, is a low, wooded and projecting point, bordered by a sandy beach, strewed with huge boulders. A ledge a mile wide extends nearly one mile off its south-west side. Hole in the Wall, the south part of the point, may be easily known by a remarkable gap in the trees at its extreme, which is conspicuous from the south-west.

Sunday rock lies 1¼ miles distant from the shore, and nearly 3 miles W. ¼ N. from Hole in the Wall, the pitch of the point; within the ledge good shelter will be found for boats in all weathers.

In rounding the west part of Estevan point, it would not be prudent to approach the shore within 2 miles.

From this point the coast takes a N.N.W. direction for 8 miles to Escalante point at the entrance of Nootka sound, and is low, foul ground existing off it for some distance.

Estevan point is situated in latitude 49° 22′ 0″ N., longitude 126° 32′ 0″ W.

NOOTKA SOUND,* of considerable political importance in former years, is a large sheet of water upwards of 6 miles in extent, containing several islands, and from its north side three long narrow arms penetrate the land for distances of 18, 7, and 14 miles respectively. Its entrance is 4½ miles wide between Maquinna and Escalante points, which bear W. by N. ½ N. and E. by S. ½ S. from each other; at the entrance the shores are low, and have several off-lying dangers, but inside the sound they become high, rugged, and precipitous, and are everywhere free from danger.

The depths between the entrance points vary from 40 to 60 fathoms, deepening within the sound to upwards of 100 fathoms in many places; but outside, to the southward of the entrance, and extending 6 miles west from Estevan and Escalante points, is a bank of 22 to 30 fathoms water, deepening gradually to the south-west. In the vicinity of the Bajo reef, and to the westward of it, are from 20 to 27 fathoms; but at a distance of 7 miles south of Nootka island 40 to 60 fathoms will be found. In fine

* *See* Admiralty plan:—Nootka sound, No. 1,916: scale, $m = 2{\cdot}0$ inches.

weather, the natives will be met with in canoes, in considerable numbers on these banks, fishing for halibut, which are very plentiful along this coast.

There are four anchorages in the sound, two of which, Friendly cove and Plumper harbour on the east side of Nootka island, are small though easy of access to steamers; the former is one, and the latter 7 miles within the entrance; the others in the Tlupana arm, though well sheltered, are more inconvenient, being 13 and 16 miles from the entrance.

Aspect.—From seaward the appearance of the land near the entrance of the sound offers to the navigator many striking features which in fine weather render it almost impossible to be mistaken; the low land of Estevan and Maquinna points at the entrance, with the breakers off them, the Nootka cone at the east point of Nootka island, and if coming from the South or S.S.W., Conuma peak, a remarkable steeple-shaped mountain, 4,889 feet high (page 312), is a most conspicuous feature.

Tides.—It is high water, full and change, in Nootka sound, at 12 hours, and the rise and fall is about 12 feet; the tidal streams are everywhere inconsiderable.

Escalante point, the eastern entrance point of the sound, is low and rocky; some small islets, and rocks generally above high water, extend off it in a westerly direction for upwards of one mile, but they are steep-to on their outer edge. At their outer end is a rock only uncovering at low water.

From Escalante point to Burdwood point at the narrowest part of entrance on the east side, the coast, which still keeps a N.N.W. direction for 3 miles, is bordered by several off-lying rocks, and should not be approached within one mile until close to the latter point, which is steep-to, and may be approached to within one cable.

Maquinna point, the west entrance point of the sound, is 13¼ miles north-west of Estevan point, and 4½ miles W. by N. ½ N. from Escalante point; it is low and wooded, and at its extreme is a remarkable bare-topped conical rock about 60 or 70 feet high; some rocks extend 3 cables off it in an easterly direction, also along the coast from it to the eastward nearly as far as the entrance of Friendly cove, and the shore should not be approached nearer than three-quarters of a mile, till near the latter place.

Bajo reef, 6 miles S.W. by W. ½ W. from Maquinna point and 2¾ miles distant from the shore, is about 2 cables in extent, and the sea only breaks on it in heavy weather. This reef is the only hidden danger outside

the sound, and is dangerous to vessels entering it from the westward. Yuquot point, the east extreme of Nootka island, kept open east of Maquinna point, bearing N.E. ¼ E., leads 1½ miles south-east of it; and Bight cone (a remarkable summit on the south side of Nootka island) kept well open west of Bajo point bearing N. by W., leads 1¾ miles west of the reef.

FRIENDLY COVE,* at the east extreme of Nootka island, just within the narrowest part of the entrance to the sound and about 2½ miles north-east of Maquinna point, is about 2 cables in extent and sheltered from the sea by several small rocky islets on its south-east side. The entrance, one cable wide, is from the north-east. The shores on both sides of the cove are rocky and about 60 feet high on the north side, but at the head is a small space of clear cultivated flat land, around which in the summer the natives build an extensive village.

Anchorage in Friendly cove, in from 5 to 9 fathoms, is of small extent, affording only room for one vessel of moderate size to lie moored in the middle, though several small ones would find shelter.

Directions.—If desiring to anchor in Friendly cove, round Observatory islet, the east entrance point, close to, and if in a large vessel moor with anchors S.S.W. and N.N.E., letting go the first immediately on entering the cove. Sailing vessels, unless with a fair wind, would find some difficulty in entering; and if unable to shoot in, it would be preferable to warp or proceed farther up the sound to Plumper harbour.

Supplies.—No fresh water in any quantity can be procured at Friendly cove, or nearer than Marvinas bay; but fish and deer may generally be obtained in large quantities from the natives.

Marvinas bay.—The west shore of Nootka sound from Friendly cove runs in a N.N.W. direction for about 6 miles to the entrance of the Kendrick arm and Tahsis canal; it is rocky, and near the south part some islets lie parallel to it, extending for nearly 2 miles, distant about 3 cables from the shore. There are two small creeks with entrances too narrow for a vessel to enter; the northernmost of them, named by the Spaniards Boca del Infierno, lies abreast the north part of the above-mentioned islands, and 1¾ miles from Friendly cove. Marvinas bay, 4 miles N.N.W. from Friendly cove, on the east side of Nootka island, is of small extent and open to the southward; it only affords anchorage to a coaster.

Water.—There are large fresh-water streams at the head of Marvinas bay, and just south of it, convenient for watering.

Kendrick arm, at the west end of Nootka sound between Nootka and Narrow islands, is about 5 miles long in a north-westerly direction, and half a mile wide, connected at the north part by a narrow boat pass

* See plan of Friendly cove on Admiralty chart, No. 1916; scale, *m* = 11·8 inches.

to the Tahsis canal; on the west side, 2 miles from its south part, is Plumper harbour, easy of access, and well sheltered. Northward of this harbour the shores of the arm on both sides are rocky, terminating in two narrow creeks at the head, useless for purposes of navigation.

PLUMPER HARBOUR, on the west side of Kendrick arm, and 6 miles from Friendly cove, is a small bay indenting the east side of Nootka island, about 3 cables in extent and affording good anchorage in 12 fathoms. It is protected on the east side by two small wooded islets from 30 to 40 feet high; on the west side the shore is rather swampy, and there are several fresh-water streams.

Anchorage.—There is a clear passage into the harbour between the two islets, or to the northward of the north one, which may be rounded at the distance of one cable, and there is room for a vessel to lie at single anchor inside; it is the best anchorage in the sound, the only drawback being its distance from the entrance.

Tahsis canal, the entrance to which is at the north-west part of Nootka sound, about 6 miles from Friendly cove, is a long narrow arm of the sea, nearly straight, and 14 miles long in a N.W. by N. direction; the shores are mountainous, rocky, and steep-to, and there is no anchorage in it. In many parts this canal is only 2 cables wide, but it becomes gradually broader at the head, where is a large stream, and also a considerable village, to which the natives resort during the season for salmon, which are caught here in great plenty.

At 10½ miles from the entrance of the canal on the west side, and separating the north point of Nootka island from the main of Vancouver island, are the Tahsis narrows, one cable wide, with 28 fathoms in the centre; they connect Esperanza inlet with the Tahsis canal; the tide runs weakly through them, the flood from the westward.

At the entrance of Tahsis canal is a small island with a clear passage about one cable wide on both sides of it.

Bligh island, lying in the centre of Nootka sound, is the largest island in it, being about 4½ miles long in a northerly direction, and 2 miles wide in the northern part; its shores are rocky, and indented by creeks on the southern side. Its south extreme is a long narrow point about 3 miles north-east of the entrance to the sound, and off its south and west sides are a number of islands extending upwards of one mile from it, all steep-to on their outer edges, but among which no vessel should venture. The south part of the island is rather low, but it rises in the north and west parts to 1,030 and 1,200 feet.

Resolution cove, at the south-east point of this island, just within the entrance of the Zuciarte channel, is only deserving of notice as the spot

where Captain Cook refitted his ships in April 1778; it is only a slight bend in the coast, with a deep and rocky bottom, and inconvenient for an anchorage, being also open to the south-west.

Junction island, lying about midway between the south-east point of Narrow island and west side of Bligh island, is about half a mile long and 250 feet high; a small islet lies close off its north-west side and another on the opposite side. The channel lies to the west and north of Junction island, and no vessel should pass between the latter and Bligh island.

Zuciarte channel, between the east shore of Nootka sound and Bligh island, is about 5 miles long in a northerly direction, and upwards of half a mile wide in the narrowest part; its shores are high and clear of danger, the depths within the channel varying from 80 to 100 fathoms.

Guaquina, or **Muchalat arm,** extends 17 miles in an E.N.E. direction from the north-east part of Nootka sound, and varies in breadth from one-quarter to upwards of one mile. It is bounded on both sides by mountains from 2,000 to 4,000 feet high, and presents similar features to the inlets before described along this coast, terminating in low land at the head, through which a small stream flows into the inlet; there is no anchorage whatever within this arm except for coasters.

One and a half miles within the entrance is Gore island, which is narrow, and about 3 miles long, in an east-north-east direction; there is a clear deep passage on either side of it, the southern one being less than one cable wide at the east part. The island rises in the centre to 1,200 feet, sloping gradually to each end; its shores are rocky.

On the north side of this arm, 14 miles within the entrance, is an extensive valley, through which flows a large stream, named the Gold river, indications of that metal having been discovered there; the land in the vicinity of this stream is lightly timbered and very fertile; a small vessel may enter it at high water.

The Muchalat Indians have a village at the mouth of Gold river.

TLUPANA ARM, the entrance to which is in the north part of Nootka sound, is about 7 miles long in a northerly direction, branching off at the head in two smaller arms extending to the north-west and north-east, the former about 3 miles, the latter 2 miles long, and each terminating in low land. Its shores are high and rocky, and the depths in it vary from 80 to upwards of 100 fathoms; there are two anchorages, one at Deserted creek on the west side, and the other at Head bay, the termination of the north-west branch.

The mountains at the north part of this arm are the highest in the sound, many being from 4,000 to 5,000 feet above the sea; Conuma peak

rising 7 miles north-east from the head, is 4,889 feet high, and of a steeple shape.

Deserted creek, on the west side of the arm 3 miles within the entrance, is 2 miles long in a westerly direction and about 2 or 3 cables wide; a vessel may anchor in 12 to 14 fathoms at one-third of a mile from its head. Island bay, a small cove on its north-east side, just within the entrance, has an islet in the centre, to the westward of which is room for a vessel to anchor in 12 fathoms.

At the southern extreme of the promontory separating the two branches at the head of Tlupana arm is Perpendicular bluff, a remarkable precipice of considerable height.

Head bay, the termination of the western branch of the Tlupana arm, is nearly one mile long in a westerly direction, about 4 cables wide, and affords anchorage in from 14 to 16 fathoms at the distance of 3 or 4 cables from its head. At the entrance on the north side are three small islets about 3 or 4 feet above high water, the inner one connected to the shore by a beach at low water; between these islets and Perpendicular bluff is a small bay, where a vessel may anchor in from 16 to 18 fathoms.

Directions.—Entering Nootka sound from the southward, after rounding Estevan point steer about N.N.W. for the entrance, which will be easily made out by the rocks off Escalante and Maquinna points; keep about 2 miles off the eastern shore till past Escalante point, when steer up mid-channel into the sound. If bound to Friendly cove haul over to the west side of entrance for Yu quot point, which may be approached within a distance of one cable, and rounding it sharply, anchor or moor, as most convenient, in Friendly cove in from 5 to 9 fathoms.

If bound to Plumper harbour, after passing Yu quot point keep about half a mile from the north-east side of Nootka island, on a N.N.W. or N. by W. course for 5 miles to the entrance of the Kendrick arm, when steer up the latter in mid-channel till abreast Plumper harbour, which may be entered by passing between Bold and Pass islets on its east side, or going to the northward of the former; anchor in 11 to 12 fathoms near the centre of the harbour.

Should it be desired to anchor in any of the anchorages within the Tlupana arm, steer as before directed till within half a mile of the entrance to the Kendrick arm, when haul to the north-east, pass to the westward of Junction and Bligh islands, and steer up the Tlupana arm in mid-channel, or close to on either shore. Deserted creek and Head bay are clear of danger and may be entered without difficulty.

Entering Nootka sound from the westward, on nearing Bajo point do not approach the south shore of Nootka island within 4 miles, or shut in

Bight cone with Bajo point bearing N. by W., until Yu quot point opens east of Maquinna point bearing N.E. ¼ E., which will clear the Bajo reef; a vessel may then steer for the entrance of the sound, about N.E. by E., not approaching the shore between Maquinna and Yu quot points nearer than one mile, until abreast the latter, which may be rounded close to; after which proceed up the sound as before directed.

If beating into Nootka sound, when standing to the westward, keep Yu quot point open east of Maquinna point bearing N.E. ¼ E., which will keep a vessel well clear to the eastward of Bajo reef; in standing to the eastward do not approach Escalante point within 1½ miles, nor bring Burdwood point to bear northward of N. by E. until abreast it, when the shore may be approached close to; when standing towards Maquinna and Yu quot points on the west side, avoid bringing the latter to bear to the eastward of N.N.E. until abreast it, when it may be approached close to.

Nootka sound is easier of access than any other place on the whole of the west coast of Vancouver island, the entrance being nearly 2 miles wide in the narrowest part; and by attending to the above directions any sailing vessel may beat in or out of the sound. If the night be clear, and provided with a chart, it may be entered without risk by bringing the entrance to bear N.N.E., and in a steamer but little difficulty would be experienced in picking up the anchorages of Friendly cove and Plumper harbour.

NOOTKA ISLAND, which bounds the west side of Nootka sound, is of considerable extent, being 15 miles long in a northerly and 20 miles in a westerly direction. Its south, or outer shore is low, rising gradually inland to summits 1,500 and 2,900 feet above the sea, and has a beautiful and fertile appearance; it is bordered by a sandy beach nearly the whole distance, and the sea breaks heavily along it.

Bajo point, 6 miles west from Maquinna point, is low and rocky. A ledge named the Inner Bajo reef extends 1¼ miles from it in a southerly direction; and the Bajo reef (*see* page 309) lies 2¾ miles S.S.E. from it.

Westward of Bajo point the coast takes a west-north-west direction for 10 miles to Ferrer point, and is slightly indented. Bight cone, a remarkable summit, 540 feet high, rises 3 miles N.N.W. ½ W. from Bajo point, and is about one mile inland.

When navigating along the south side of Nootka island west of the Bajo reef, it would not be prudent to approach the shore within 2 miles, until near Ferrer point, though there are no known outlying dangers.

NUCHATLITZ INLET,* on the north-west side of Nootka island, about 18 miles W. by N. ½ N. from the entrance to Nootka sound,

* *See* Admiralty plan:—Esperanza and Nuchatlitz inlets, No. 589; scale, *m*=2·0 inches.

is 6 miles long in a north-easterly direction, and 3 miles wide at entrance, narrowing towards the head; its shores are high and rocky, and much broken into creeks and small bays: off the entrance, and within are several dangers. The depths in the inlet vary from 5 to 17 fathoms, and there are two good anchorages, port Langford on the north side, and Mary basin at the head; but owing to the dangers off the entrance of the inlet, they are both rather difficult of access.

Ferrer point, the south entrance point of the inlet, is low and rocky; there is a depth of 14 fathoms at a distance of 2 cables from it, and half a mile eastward of the point is North-west cone, a very remarkable conical summit 350 feet high, which proves a very useful guide to this locality from the westward.

Danger rock, lying in the south part of the entrance, upwards of one mile N.W. ½ W. from Ferrer point, is the worst danger in entering, as it is of very small extent, and the sea only breaks on it in heavy weather; it is steep-to on all sides, there being 11 fathoms close to it. The best passage into the inlet is between this rock and Ferrer point.

Leading mark.—Mark hill, at the head of inlet, in line with the north part of Fitz island bearing N.E. ½ E., leads south of this rock midway between it and Ferrer point, and through the fairway into the inlet.*

Nuchatlitz reef, in the centre of the entrance and one-third of a mile north of Danger rock, is about three-quarters of a mile long in an E.N.E. and W.S.W. direction, and one cable wide. The sea generally breaks on this reef, and at its eastern extremity is a small rock awash at high water; there is a clear deep passage between it and Danger rock, and also apparently to the northward of it, but neither should be attempted by a stranger, as no leading marks can be given for going through them.

South reef, nearly 2 cables in extent and covering at three-quarters flood, lies just within the entrance on the south side, one mile N.E. by N. from Ferrer point, and about 3 cables distant from the shore.

Mark hill, in line with the north summit of Fitz island bearing N.E. ½ E., leads 2 cables north of this reef.

Louie creek, just inside South reef, is shoal, and nearly a mile in extent; there are several rocks off its entrance, and no vessel should enter it: to the eastward of the creek the south shore of Nuchatlitz inlet is rocky, but appears to be clear of danger at the distance of one cable.

Fitz island, in the centre of the inlet, and 3 miles from the entrance, is of small extent, low, rugged, and covered with a few stunted pine trees, the tops of which are about 100 feet above the sea. At half a mile west

* *See* View A. on Admiralty chart, No. 589.

of it is a small bare island 20 feet high, and steep-to on the west side, but between the rock and Fitz island foul ground exists.

Bare rock, of small extent, and 12 feet above high water, lies three-quarters of a mile to the south-west of Fitz island, and there is a clear passage between them.

Mary basin, the termination of the inlet, is of considerable extent, and completely land-locked by Lord island, which lies across the inlet at the south-west part of the basin. The depths inside the basin vary from 5 to 9 fathoms, and the entrance on the north side of Lord island appears clear of danger, but it has not been sufficiently examined to recommend its being used by a stranger.

To the eastward of Mary basin, and connected to it by a narrow pass 50 yards wide, with from 7 to 9 fathoms, is Inner basin a sheet of water upwards of 3 miles long in an easterly direction, with from 20 to 39 fathoms, and apparently useless as an anchorage.

Port Langford, on the north side of Nuchatlitz inlet, 2 miles within the entrance, is about 1¾ miles long in a north-westerly direction, and varies in breadth from one-quarter to half a mile. The depths in it vary from 5 to 8 fathoms, and it affords a secure and well-sheltered anchorage in about 6 fathoms, muddy bottom, at the distance of half a mile from the head. The east shore of the port is high, rising to a summit (Mt. Rosa) 2,553 feet above the sea, but the western shore is much lower; both are rocky, but within the entrance clear of danger.

Colwood islet, at the south-west extreme of the entrance, is small, and bare, 20 feet high, and nearly half a mile off shore; it may be approached to within one cable on the east side, but inside it, and to the westward round the north entrance point of Nuchatlitz inlet, are innumerable rocks and small islets, among which no vessel should venture.

Belmont point, the east entrance point into port Langford, is two-thirds of a mile N.E. ¼ E. from Colwood islet; it is low, and a rock uncovers one cable west of it.

Directions.—Entering Nuchatlitz inlet from the southward, bring Ferrer point on a N. by W. bearing, and steer to pass half a mile west of it; and when Mark hill comes in line with the north part of Fitz island N.E. ¼ E., haul in for the entrance on that mark, which will lead in clear of Danger rock and South reef. When Ferrer point bears South, a vessel will be inside the rock, and may steer N. by E. ½ E. or N.N.E. for the entrance to port Langford; pass midway between Colwood islet and Belmont point, and proceed up the port in mid-channel, anchoring in 5 or 6 fathoms, at a distance of half a mile from the head.

Approaching the port from the westward, keep an offing of 4 or 5 miles till Ferrer point bears East, when steer for it on that bearing till the leading mark for the channel (Mark hill in line with the north part of Fitz island N.E. ½ E.) comes on, when proceed as before directed to the anchorage in port Langford.

Intending to enter Mary basin (which is not however recommended), when past Ferrer point keep the leading mark on till abreast Louie creek, then steer a little to the eastward, passing about one cable south of Fitz island and Bare rock (south-west of it); when past the former steer N.E. by E. ½ E. until the west point of Lord island bears N. by E., which will clear the shoal extending half a mile to the southward from Benson point, and then, on approaching Lord island, borrow a little towards the north shore and enter Mary basin to the westward of the island and the small islet north-west of it; when abreast the latter haul more to the eastward and anchor in from 5 to 6 fathoms near the middle of the basin.

No vessel of any size should attempt to beat into this inlet, as there is generally a heavy sea at the entrance, and no stranger should attempt to enter unless the leading mark is easily distinguished.

Tides.—It is high water, full and change, in Nuchatlitz inlet at 12 hours; springs rise about 12 feet.

ESPERANZA INLET,* the entrance to which lies between the north-west side of Nootka island and the main land of Vancouver island, 122 miles W. by N. ¾ N. from the lighthouse on Tatoosh island, is about 16 miles long in a winding north-easterly direction, with an average breadth of about one mile, narrowing at the head, and connected by a narrow pass (Tahsis narrows) to the Tahsis canal in Nootka sound.

The entrance, though wide, contains several dangers; but inside the shores are nearly everywhere steep-to, rising on both sides to mountains of considerable height. The southern shore is indented by three bays of moderate extent, which, however, afford no anchorage; and from the northern one three arms of considerable length penetrate the Vancouver shore for several miles in a N.N.W. direction. Port Eliza, in the western arm, is the only anchorage in the inlet.

The depths in the entrance vary from 12 to 20 fathoms, deepening within to upwards of 100 fathoms in many parts.

Middle channel, the widest and best into Esperanza inlet, is 3 miles long in a northerly direction, and upwards of one mile wide in the narrowest part. Its entrance lies 3 miles W.N.W. from Ferrer point, between Blind

* *See* Admiralty plan:—Esperanza and Nuchatlitz inlets, No. 589; scale, $m = 2{\cdot}0$ inches.

reef, Needle rock, and a number of small islets extending off the north-west point of Nootka island on the east, and Middle reef and Black rock on the west; a part of the former is always above water.

Blind reef, at the south-east extreme of the channel, 3 miles N.W. ½ W. from Ferrer point, is about 2 cables in extent, and the sea only breaks on it in bad weather; one cable north of it is a small rock, and at a distance of 2 cables from its south and west sides are depths of 13 to 19 fathoms.

Pin rock, of small extent awash at low water, lies two-thirds of a mile east from Blind reef.

Needle rock, which is of small extent, lies two-thirds of a mile north of the Blind reef, and has from 14 to 15 fathoms at a distance of 2 cables west of it.

Middle reef, at the south-west entrance point of Middle channel and separating it from the North channel, is about 3 cables long in a northerly direction, and one cable wide. The sea generally breaks on this reef, and at its south extreme is a small rock 4 feet above high water; there are from 5 to 20 fathoms, at the distance of one cable on all sides of it; its south part lies 4 miles N.W. by W. ¾ W. from Ferrer point.

Leading mark.—Leading hill in line with Black rock bearing N. by W. leads through the fairway of Middle channel two-thirds of a mile west of Blind reef, one mile west of Needle rock, and half a mile east of Middle reef.*

North channel leads into Esperanza inlet west of Middle reef, between it and the dangers off the south-east point of Catala island. It is about one-third of a mile wide, and upwards of 2 miles long, merging at the north part into Middle channel; the depths in it vary from 17 to 22 fathoms, and the dangers on its west side are all above water.

Leading mark.—Black rock in line with Double island bearing N. by E. ¾ E., leads in through the fairway of North channel clear of all danger.†

CATALA ISLAND, 5½ miles N.W. ½ W. from Ferrer point, on the west side of the entrance to Esperanza inlet, is about 1¾ miles long in a westerly direction, and one mile wide in its broadest part. It is wooded and from 150 to 200 feet high, its shores are rocky, and several dangers exist at a considerable distance off it on all sides; its north side is separated from the Vancouver shore by a passage half a mile wide, named Rolling roadstead, and a vessel may find a tolerably secure

* *See* View C. on Admiralty chart, No. 589.

† *See* View B. on Admiralty chart, No [illegible]

anchorage there in from 4 to 6 fathoms, though generally a swell prevails in it.

The Twins, two small islets connected with each other at low water, lie off the south point of Catala island, and foul ground extends nearly 1½ miles south from them, terminating in Low rock (6 feet above high water), which forms the south-west entrance point to the North channel.

Black rock, which lies 4 cables S.E. from the east point of Catala, is a small bare rock 20 feet above high water; foul ground exists between it and Catala, and also one cable south of it; a vessel should not approach its eastern side nearer than 2 cables, nor attempt to pass west of it.

ROLLING ROADSTEAD. — Entrance reef, about 3 cables north of the east point of Catala island at the eastern part of Rolling roadstead, is of small extent, and covers at half flood.

Arnold rock, half a mile north from Entrance reef, and about 2 cables distant from the opposite shore, is awash at high water; midway between these rocks are 6½ fathoms, and in the roadstead from 4 to 6 fathoms. The outer rocks off the north-west part of Catala island, open north of the low grassy point at the north side of the latter, bearing W. by. S., leads into Rolling roadstead, midway between the Arnold rock and Entrance reef.

Half a mile inshore, and overlooking the north-east part of Rolling roadstead, is Leading hill, 1,104 feet above the sea; it is of conical shape, and conspicuous from the entrance to the Middle channel.

Double island lies half a mile from the west shore at the inner and narrowest part of the entrance to Esperanza inlet, and 3½ miles within the outer part of the North and Middle channels. It is of small extent, and wooded; a number of rocks exist between it and the shore, but 2 cables distant from its east side are depths of 25 to 45 fathoms.

Flower islet, on the opposite shore, one mile E.S.E. from Double island and half a mile distant from the north-west point of Nootka island, is small and bare, and is the northernmost of the islets off Nootka island between the entrances of Nuchatlitz and Esperanza inlets. At 2 cables south-west from it is a small rock 2 feet above high water, and 3 cables west from it a depth of 50 fathoms.

Eastward of Flower islet the south shore of Esperanza inlet takes a winding irregular outline to the E.N.E., is everywhere steep-to, and rises gradually to summits 2,000 and 3,000 feet high. There are three bays, all too deep for anchorage; in the western one, which is just within the entrance, are several small islets.

Centre island, half a mile off the south shore, and about 1½ miles north-east of Flower islet, is about three-quarters of a mile long in an east and west direction, and of moderate height; its shores are rocky, and may be approached to one cable.

Hecate channel, near the head of the inlet, is 4¾ miles long in a winding direction to the eastward, and its average breadth is about 6 cables. The western end is 8 miles from the entrance of Esperanza inlet; and the eastern (Tahsis narrows), is about one cable wide, with 28 fathoms, connecting this channel with the Tahsis canal in Nootka sound; the shores are high and rocky, and may be approached close to.

PORT ELIZA, the entrance to which is on the north side of Esperanza inlet, one mile north-east of Double island, is a narrow arm 5½ miles long in a N.W. direction, its breadth varying from 2 to 4 cables; the shores are high, and there are some rocks and small islands in the entrance, and along the eastern shore. There is good anchorage in from 14 to 15 fathoms at half a mile from the head, and also in Queen's cove, which is upwards of one mile within the entrance on the east side.

The head terminates in a small patch of low swampy land, through which flow two fresh-water streams, and off it a bank dries one cable at low water.

Harbour island, in the centre of the entrance, is about 4 cables in extent, wooded, and of moderate height. The passage into port Eliza on its east side, through Birthday channel, is 2 cables wide in the narrowest part, and clear of danger. Between Harbour island and the west shore lies False channel, which has irregular soundings, and in its south part are two rocks which cover at half flood.

Fairway island, on the east side of Birthday channel, and 4 cables east from Harbour island, is of small extent, and covered with a few stunted trees; some rocks extend a short distance off around it, the eastern ones being about 6 feet above high water.

Channel reef, half a mile N.N.W. of Harbour island, in the middle of port Eliza, is about one cable in extent, and covers at three-quarters flood; at one cable from its eastern side, are from 16 to 26 fathoms; beyond this reef there are no dangers in the port at more than one cable from the shore.

Queen's cove* on the east side of the port, about 1½ miles from the entrance, is 5 cables long, and 2 cables wide, but at the entrance the width is contracted to half a cable by a small island, which at low water,

* *See* plan of Queen's cove on Admiralty chart, No. 589; scale, *m* = 12·0 inches.

is connected to the eastern side of the cove. The channel lies to the westward of the island.

The cove affords room for a large vessel to lie moored in the centre in from 6 to 7 fathoms water. Its shores are high, and rocky, and it is completely land-locked, but it is easy of access for a steamer; a large sailing vessel would, however, be most likely obliged to warp in; there is a fresh-water stream of considerable size on the west side of its head, very convenient for watering.

ESPINOZA ARM, the entrance to which is 2 miles north-east of port Eliza, is 8 miles long in a N.N.W. direction, and its average breadth is half a mile. The soundings within it are deep, and it affords no anchorage; at the entrance, on the west side, are some small islets, and a rock which uncovers. This inlet presents similar features to the other inlets along the coast, being bounded by high, rocky, rugged shores, and terminating in low land at the head. At the distance of 4 miles within the entrance, on the east side, is a narrow branch or fork extending 3 miles north-east to its head, which is separated by a narrow neck 3 cables wide from the Zeballos arm, forming a peninsula of considerable size to the southward. The entrance to this narrow branch is choked up with rocks.

ZEBALLOS ARM, the entrance to which lies 10 miles within the inlet, at the west end of Hecate channel, is about 6 miles long in a winding direction to the north-west, and about two-thirds of a mile wide; similar to Espinoza arm, it offers no anchorage whatever, and is of no use to the navigator.

Directions.—A stranger entering Esperanza inlet from the southward, through the Middle channel, and intending to anchor in port Eliza, should pass Ferrer point at a distance of about 3 miles, and keep on a northerly course till nearing the entrance to Middle channel, when steer to bring Leading hill in line with Black rock bearing N. by W., which will lead through the fairway, and clear of the dangers on both sides of the channel. When the south point of Catala island bears W.N.W., a vessel will be inside the dangers at entrance, and should steer about N.N.E. for the entrance to port Eliza, passing from 2 to 3 cables east of Double island. When entering the port steer through Birthday channel, passing one cable east of Harbour island; when past the east point of the latter, keep about N.W. by N. for the entrance to Queen's cove, or further over to the eastern shore, to avoid Channel reef; in entering the cove, pass to the west of the island at its entrance, and moor immediately the vessel is inside, anchors N.W. and S.E.

If going to the head of port Eliza, keep on as before directed till within one cable of Queens cove, when haul sharply to the westward, keeping about one cable from the east shore, till Fairway island comes in line with the east point of Harbour island bearing S.E. by E., when the vessel will be west of Channel reef, and may steer up the port in mid-channel, anchoring near the centre, about 4 or 5 cables from the head, in 15 or 16 fathoms.

No sailing vessel of any size should attempt to enter port Eliza unless with a steady fair wind.

If bound to Rolling roadstead, enter the Middle channel as before directed, but instead of steering for the entrance of port Eliza, keep on a N. by W. or N. $\frac{1}{2}$ W. course, (passing about one-quarter of a mile east of Black rock,) until the outer extreme of the islets off the north-west part of Catala island come open north of the low grassy point on its north side bearing W. by S., when haul in for the roadstead on that mark, which will lead midway between Arnold and Entrance reefs; anchor in 6 fathoms, with the extremes of Catala island bearing W.S.W. and S.E. by S.

Entering Esperanza inlet from the westward, keep an offing of $2\frac{1}{2}$ or 3 miles from Catala island (if Kyuquot hill be made out, by keeping it open west of Tat chu point N.W. by W., a vessel will be well clear of any dangers off Catala island), till Double island comes in line with Black rock bearing N. by E. $\frac{3}{4}$ E., and enter the inlet through the North channel with this mark on, which will lead in clear of danger. When the Twins islets bear N.W. by W., haul more to the eastward, passing one-quarter of a mile outside the Mid and Black rocks, and steer for Rolling roadstead or port Eliza as before directed.

If the weather be clear and the marks can be made out, both North and Middle channels are equally good, the latter being wide enough for a vessel to beat through, though it would be hazardous for a stranger to attempt, as no turning marks can be given.

Generally a heavy swell prevails off the entrance to Nuchatlitz and Esperanza inlets, and no sailing vessel should attempt to enter, or leave either of them, unless with a steady fair, or leading wind.

Depths of 20 to 40 fathoms extend for nearly 20 miles westward from the entrances to Nuchatlitz and Esperanza inlets; at a distance of 10 miles off shore, to the S.S.W., are from 70 to 80 fathoms.

Tides.—It is high water, full and change, in Esperanza inlet, at 12h. 0m.; springs rise 12 feet.

The COAST,* westward of Catala island to Tat chu point, takes a westerly direction for upwards of 3 miles, is indented by two small

* *See* Admiralty charts:—Quatsino to Esperanza, No. 583; scale, $m = 0{\cdot}5$ of an inch.

sandy bays, and bordered by a number of rocks, some of which extend nearly 2 miles off shore. Tat chu point is cliffy; some rocks lie a short distance to the southward of it, and there is a native village of considerable size at half a mile east of it. Eliza dome, a remarkable summit, 2,819 feet above the sea, rises 1½ miles N.N.W. of the point, and is very conspicuous from seaward.

From Tat chu point the coast turns to the W.N.W. for 7 miles to the entrance of Kyuquot sound, and is indented by several small bays, in some parts of which boats may find shelter.

BARRIER ISLANDS.—At 2 miles westward of Tat chu point is the commencement of a chain of small islands and reefs bordering the coast of Vancouver island for nearly 20 miles in a westerly direction to the entrance of Ou ou kinsh inlet. They extend in some parts as far as 5 miles off shore, and through them are two known navigable channels, the Kyuquot and Halibut, leading to anchorages the former channel leads into Kyuquot sound, and the latter into Clan ninick harbour, but as a rule no stranger should venture in the channels among these islands, unless the weather be clear, or without a pilot.

Highest island, one of the Barrier group, lying 2 miles south of Union island, is a remarkable bare rock 98 feet high, and useful in identifying the Kyuquot channel.

In thick weather no vessel should stand nearer the Barrier islands than into a depth of 40 fathoms.

KYUQUOT SOUND,* the eastern entrance to which is 12 miles from Esperanza inlet, is a large broken sheet of water penetrating from the coast to a distance of 14 or 15 miles inland in two large arms, and several smaller ones. Union island, a large island 1,484 feet high lying at the entrance, forms on either side of it a channel into the sound, the eastern one only being fit for large vessels; there are also several islands within, mostly small; its shores are mostly rocky and very much broken, rising to high mountains, 2,000 and 4,000 feet above the sea.

The depths outside vary from 20 to 40 fathoms, mostly sandy bottom; at the entrance are from 40 to 60 fathoms, but within the sound the depths increase in many places to upwards of 100 fathoms. There are three anchorages, Narrowgut and Easy creeks, and Fair harbour, the two latter being of considerable size but at a distance of 13 and 10 miles from the entrance; the former, though very small, is only 5 miles within the sound.

* *See* Admiralty plan:—Kyuquot sound, No, 717; scale, $m = 1{\cdot}8$ inches.

Kyuquot channel leads into the sound through the Barrier islands, and to the eastward of Union island. It is nearly straight, about 5 miles long in a N.N.E. direction, and about three-quarters of a mile wide; past the Barrier islands it is bounded on the west by Union island, and on the east by the mainland of Vancouver island; the depths in it vary from 30 to upwards of 40 fathoms, increasing gradually to the inner part, and a mid-channel course through is clear of danger.

East Entrance reef, one of the Barrier group lying at the south-east extreme of the channel, 6½ miles W. by N. ½ N. from Tat chu point, is about 2 cables in extent and 4 feet above high water; no vessel should stand inside it, nor, when entering the channel, round the reef nearer than half a mile.

Rugged point, the south-east entrance point to Kyuquot sound, is upwards of 2 miles north of East Entrance reef on the east side of the channel; it is rugged and rocky, but steep-to on the west side; between it and East Entrance reef are a number of rocks, among which no vessel should venture. The east side of the channel to the northward of this point is formed by the Vancouver shore, and is slightly indented and steep-to, to the termination of the channel.

West rocks, at the south-west extreme of Kyuquot channel and 2 miles N.W. ½ W. from East Entrance reef, are two in number, the highest being 50 feet above high water; some rocks which cover at a quarter flood extend half a mile south-east from them, with 20 fathoms close to their outer edge. When navigating the channel do not approach West rocks within two-thirds of a mile.

White Cliff head, the south-east extreme of Union island, is one mile N.N.E. of the West rocks, and abreast Rugged point; it is about 70 feet high, faced to the southward by a remarkable white cliff; there are 35 fathoms within one cable of it. Half a mile N.N.W. of the head is Kyuquot hill, a remarkable summit 740 feet high, bare of trees on its east side, and very conspicuous from seaward.

Northward of White Cliff head, the east coast of Union island trends in an irregular outline to the N.N.E., for 2½ miles, to Chat channel point; it is generally rocky, and rises gradually to summits 800 or 900 feet high.

Chat channel point, the north-west extreme of Kyuquot channel and the east point of Union island, is a low rocky point with a remarkable nob just inside it; a rock which covers at a quarter flood lies 2 cables east of it, and the point should not be rounded nearer than half a mile.

Leading island, just northward of Kyuquot channel, and nearly 3½ miles from White Cliff head, is about 1¼ miles long in an east and west direction, and half a mile wide; its shores are steep-to, and the island rises near the centre to a summit 489 feet high, which, when kept midway between White Cliff head and Rugged point, N. by E. ⅝ E., leads into the sound through the fairway of Kyuquot channel.*

Union island, at the entrance to the sound, and protecting it from the ocean, is of square shape, and upwards of 3 miles in extent; its surface is undulating, rising in the north-west part to 1,484 feet; the shores are rocky and much broken on the south and west sides.

Blind entrance leads into Kyuquot sound westward of Union island, between it and the Vancouver shore, forming a narrow tortuous channel with some rocks in the outer part; it should not be entered by a stranger, though coasters often enter the sound by this channel, but no directions can be given for navigating it.

Narrowgut creek, in the south-east part of the sound, about 1½ miles from the termination of the Kyuquot channel, is one mile long in a north-easterly direction, but is less than one cable wide just inside the entrance. The depths in it vary from 16 to 8 fathoms, and there is only just room for a vessel to moor; the shores are high, the entrance is clear of danger, and the creek easy of access to a steamer. A stream of considerable size disembogues at the head of the creek, from which a bank extends off 3 cables.

Shingle point, at the entrance to the creek on the north side, is bordered by a sandy beach, and has 9 fathoms close to.

Deep inlet, at 1½ miles north from Narrowgut creek, is about 3 miles long in a north-easterly direction, but affords no anchorage; on its north side, at the entrance, is a remarkable high precipice.

Ho hoae island, nearly in the centre of the sound, half a mile north of Union island, is about 2 miles long in a north-easterly direction, upwards of one mile wide, and about 600 feet high; its shores are rocky, and steep-to. On its north-east side is Dixie cove, where a small craft may anchor in 6 fathoms completely land-locked.

Pinnace channel, between Ho hoae island and the east shore of the sound, is about 3 miles long in a northerly direction, and half a mile wide, clear of danger, the depths in it varying from 46 to upwards of 100 fathoms.

TAHSISH ARM, in the north part of the sound, has its entrance 5 miles from the termination of Kyuquot channel. It is 6 miles long in a

* *See* View on Admiralty chart, No. 717.

winding direction to the northward, and its shores, except at the head, are high, rugged, and mostly steep-to: the head terminates in low swampy land, through which flows a considerable stream off which a bank dries one cable; and there is small village at the mouth of the stream; on the east side, 2 miles below the head, is a similar stream, off which a bank extends about 2 cables.

Fair harbour, on the east side of Tahsish arm, is of an oblong shape, 2½ miles in length in a N.E. direction, from 3 to 4 cables wide, and affords anchorage near either end in from 13 to 11 fathoms; its shores, generally, are high, and steep; at its head a bank dries off for one cable. The western end of the harbour is formed by a low, narrow neck, about one cable wide at low water, connecting an island to the mainland of Vancouver, and separating the harbour from Pinnace channel. The entrance lies on the north side of this island, is nearly one mile long, and from one to 2 cables wide, with some small islets on its north side, the depths in it being very irregular, varying from 5 to 20 fathoms; when entering keep the south shore pretty close on board, but take care to avoid a rock which lies on that shore about half-way in. A patch of 9 feet lies abreast it, and therefore considerable caution must be observed. This harbour can be entered by steamers, or sailing vessels with a fair wind.

Some rocks, the outer one of which covers, lie 3 cables south west from the entrance to Fair harbour, about one cable distant from the shore.

Moketas island, in the north part of the sound, between the entrance to the Tahsish and Kokshittle arms, is about 2 miles long, and one mile wide, rocky, about 400 feet high, its east and west sides being steep-to. At one cable from its north shore, near the centre, is a sunken rock, and on its south-east side lie the Channel rocks, a small patch, about 3 feet above high water; they, however, are steep-to.

The passage between Moketas island and the north shore of the sound, is 3 cables wide in the narrowest part, with from 14 to 38 fathoms in mid-channel; if using it a vessel ought to keep well over to the north side.

Kokshittle arm, the entrance of which is in the north-west part of the sound, about 6 miles from Kyuquot channel, is upwards of 8 miles long in a north-westerly direction, and about one mile wide at the entrance, narrowing gradually towards the head; its shores are rocky, and of a broken outline, with several small islets off them. The depths in it vary from 20 to 80 fathoms, shoaling gradually towards the head, and there are no dangers; a very good anchorage, the best in the sound, is on its west side at 4 miles from the entrance. The head of the arm terminates in low swampy land, through which flows a small stream, and a bank extends off for the distance of about 2 cables.

Just within the entrance, on the east side, is a small cove with 4 fathoms in the centre, available for small craft.

Easy creek, the anchorage before referred to on the west side of Kokshittle arm, and 13 miles from the entrance of the sound, is about 2 miles long in an E.S.E. direction, turning sharply round from its entrance and running in this direction parallel to the inlet, being separated from it by a narrow rocky peninsula. It is 4 cables wide at the entrance, narrowing gradually to the head; the depths in it vary from 12 to 20 fathoms, and there is good anchorage from half a mile within the entrance to the head. The shores are rocky, of moderate height, steep-to on the north side, but from the south a sand-bank dries off in some parts for the distance of nearly one cable. The best anchorage is one mile within the entrance, in from 13 to 16 fathoms, about one or 2 cables from the north shore; when entering keep near the north shore.

On the opposite side of the arm, abreast Easy creek, is a village and a stream of considerable size, off which a bank dries out about 2 cables.

Chamiss bay, on the west side Kyuquot sound, about one mile from the north part of Blind entrance, is nearly half a mile in extent, but affords no anchorage, the water being too deep.

Directions.—No sailing vessel should attempt to enter Kyuquot sound, unless with a steady fair, or leading wind, as generally a heavy swell prevails outside, which in a light wind would render her position critical; and no stranger should attempt to venture in, unless the weather is clear, and the leading mark for the channel can be easily made out.

Entering the sound by the Kyuquot channel, which is the only one a stranger should use, keep a good offing, till the entrance of the channel is made out, (White cliff head, and Kyuquot hill at the south-east point of Union island, which have been before described, are very conspicuous, and will identify the channel,) when bring the summit of Leading island midway between Chat channel and Rugged points bearing N. by E. $\frac{1}{2}$ E., and steer up the channel with that mark on; when nearing Chat channel point, give it a berth of at least 4 cables to avoid the rock which lies off it. If bound to Narrowgut creek pass eastward of Leading island, and keeping about one cable from the south shore, enter the creek in mid-channel, and moor, if in a large vessel, when inside.

If bound to Fair harbour, keep as before directed till near Leading island; pass to the westward of this island, and proceed up to the northward through Pinnace channel, keeping about one cable or so from either shore, on to the entrance of Tahsish arm. On nearing Fair harbour keep from 2 to 3 cables from the east side of the arm till the entrance bears

E.S.E., when steer for it on that bearing, keeping close over to the south shore (*see* page 326) till inside, and anchor in the middle, about half a mile from the east end, in 11 fathoms.

Bound to Easy creek, pass to the westward of Leading, Ho hoae and Moketas islands; enter the Kokshittle arm in mid-channel, and proceeding up it for a distance of 4 miles will bring a vessel abreast the creek, which may be entered in mid-channel; anchor in from 13 to 16 fathoms, about one mile within the entrance, and from one to 2 cables from the shore.

Tides.—It is high water at full and change in Kyuquot sound at 12 hours; springs rise 12 feet.

CLAN NINICK HARBOUR, on the Vancouver shore, 3 miles to the westward of Kyuquot sound, is about one mile long in a westerly direction, half a mile wide, and affords good anchorage, in from 7 to 10 fathoms, at the distance of half a mile from the head, from which a sand-bank extends 2 cables; its shores are mostly low, and there are some rocks on either side of the entrance.

The harbour is protected by Village, Table, and other islands of the Barrier group, from the ocean, and there is only one channel, the Halibut, into it through them, which, though clear of danger, should not, except under unavoidable circumstances, be attempted by a stranger.

Halibut channel, through the Barrier group from the ocean to the entrance of Clan ninick harbour, lies westward of Table and Village islands, and east of Look-out island. It is about 3 miles long in a northerly direction, and half a mile wide in the narrowest part; the depths in it vary from 16 to 6 fathoms, being somewhat irregular, but a mid-channel course through, except in the northern part, is clear of danger.

Table island, on the east side of the channel, is the largest of the Barrier group, being nearly half a mile in extent, and about 150 feet high; some rocks, mostly above water, extend half a mile from its south side, the outer one being 50 feet high, with 15 fathoms 2 cables west of it. Trap bluff on the west side of the island is conspicuous.

Anchorage.—Half a mile east of Table island is an anchorage with from 4 to 6 fathoms, tolerably sheltered by some islands from seaward, and much used by coasters in summer months; the entrance to it is rather intricate, and no stranger, or any except a small vessel, should attempt to enter

Village island, on the east side of Halibut channel, just north of Table island, is small, and about 150 feet high; on its east side is a large native village, much frequented in summer; off it a bank dries nearly

3 cables. To the eastward of this island among the Barrier islands is a small cove (Barter cove), with from one to 3 fathoms; it is well sheltered in all weather, and much frequented by coasters when fur trading; the entrance to it is very narrow, and almost choked up with rocks.

Rock.—Two cables north of Village island is a rock awash at high water springs, but there is a depth of 5 to 6 fathoms at a distance of one cable from the west side.

Look-out island, at the south entrance point of Halibut channel, lies nearly one mile south-west of Table island; it is small, covered with a few trees, and about 150 feet high; its east side may be approached to 2 cables, but half a mile south-west of it are some rocks, on which the sea always breaks.

Granite island, which forms the south side of Clan ninick harbour, is about half a mile in extent, and joined by a sandy beach at low water to the Vancouver shore.

Chief rock, 3 cables east from its east point, is a very dangerous rock, which lies at the termination of the Halibut channel, and only uncovers at low-water springs.

A sunken rock is said to exist nearly midway in the entrance to the harbour, 2 cables north of Chief rock.*

Directions.—Bound into Clan ninick harbour by the Halibut channel (which is the only passage by which a stranger can enter it), keep about 2 miles off the Barrier islands till Look-out island bears N.W. by N., when steer for the entrance of the channel, passing about 2 cables east of Look-out island. When the north-west end of Table island bears N.E., steer about N.N.E., or more easterly, so as to pass 2 or 3 cables north-west of Trap bluff on its west side; on nearing Granite island, bring Trap bluff in line with the east high water part of Look-out island S.S.W. ½ W., and steer N.N.E. ½ E. for the entrance of the harbour, with the above-mentioned mark on astern, till the north side of Granite island bears W. by N. ¼ N., or the harbour comes well open, when a vessel will be clear of the Chief rock, and may haul in to the north-westward for the anchorage, passing about one cable to the southward of a small rock 2 feet above water lying on the north side of the harbour 1½ cables within the entrance.

As before noticed, no stranger should attempt to enter this harbour without a pilot, unless from absolute necessity, and if in a sailing vessel, only with a steady fair wind.

* The Hudson's Bay Company's steam vessel *Princess Louise*, drawing 9 feet, struck on this rock at low water springs

Anchorage.—Anchor in from 7 to 10 fathoms, with the extremes of the harbour bearing East and S.E. or S.E. by S.

OU OU KINSH INLET,* 10 miles W.N.W. from Kyuquot sound, is 7 miles long in a north-easterly direction, and 8 cables wide at the entrance, narrowing gradually towards the head; the shores within are high, rising from 2,000 to upwards of 3,000 feet.

The depths in the inlet vary from 40 to 60 fathoms, and there is only one indifferent anchorage, Battle bay, just within the entrance on the west side. The entrance lies west of the Barrier islands, and the depths in it vary from 14 to 48 fathoms.

Clara islet, at the south-east extreme of the entrance, is small, bare, and 20 feet above high water; no vessel should go eastward of, or approach it within half a mile. This island is the westernmost of the Barrier islands, and lies 21½ miles W. by N. from Tat chu point, where they may be almost said to commence.

Bunsby islands, on the east side of entrance, close in shore, are about 2 miles in extent, and from 250 to 300 feet high; the passages between them and the shore are choked up with rocks, but their west side is steep-to; Pinnacle point and Green head at their south-west extreme are remarkable. To the northward of these islands is Malksope inlet, 4 miles long in a north-easterly direction, but the entrance is intricate, and there is no anchorage within it.

Cuttle group, lying at the south west entrance point of Ou ou kinsh inlet, and 1½ miles N.N.W. from Clara islet, comprises a number of small islets and rocks, some of the former being wooded; nearly one mile south-west from them is a rock on which the sea breaks in fine weather. On the Vancouver shore, just north-west of them, is Low cone, a remarkable summit 356 feet high, and useful in identifying the entrance.

A vessel should not go to the westward of these islets, or approach their east side nearer than 2 cables.

Sulivan reefs are a very dangerous patch of rocks lying nearly 3 miles outside the entrance of Ou ou kinsh inlet, 2½ miles W. by S. from Clara islet, and nearly 4 miles S.S.E. from Hat island in Nasparti inlet; they are about half a mile in extent east and west, and the sea only breaks occasionally on them; there are from 10 to 11 fathoms close around them.

The entrance of Ou ou kinsh inlet open N.N.E. leads 1½ miles east of these reefs; Solander island, off cape Cook, just open or shut in by the land east of the cape bearing W. ¼ S. leads 1½ miles south; Hat island in the entrance of Nasparti inlet, in line with a summit on the west shore of

* *See* Admiralty plan:—Ou ou kinsh inlet, No. 716; scale, $m = 1{\cdot}8$ inches.

the inlet bearing North leads 1¼ miles west; and Hat island seen between the Haystacks bearing N.W. ¾ N., leads three-quarters of a mile north-east of them.

Battle bay, just within the entrance of Ou ou kinsh inlet on the west side, is upwards of a mile wide, and half a mile deep, with several islets and sunken rocks inside it near the middle; near the north part there is anchorage in from 6 to 9 fathoms, which may be used in fine weather.

Directions.—A vessel intending to enter Ou ou kinsh inlet, and anchor in Battle bay, should keep an offing of 4 or 5 miles from the main, till Clara islet at the west extreme of the Barrier islands is made out, when steer for it on a N.E. by N. bearing, passing about half a mile west of the islet, which will take a vessel well clear of the Sulivan reefs. When abreast the islet steer for the centre of the entrance about N.N.E., round the Skirmish islets, which lie in the middle of Battle bay, at a distance of 2 cables, and anchor in 7 fathoms, midway between them and the north side of the bay.

It is not recommended to use this anchorage, unless embayed, as it affords but indifferent shelter in southerly gales, and no sailing vessel should attempt to enter unless with a steady fair wind.

TIDES.—It is high water, full and change, in Ou ou kinsh inlet at 12h. 0m., springs rise 12 feet.

NASPARTI INLET,* 3½ miles west of Ou ou kinsh inlet, on the east side of a large peninsula of which cape Cook is the south-west extreme, and in the head of an open bight or bay, is about 4 miles long, in a northerly direction, and about half a mile wide at the entrance, decreasing in some places to less than 3 cables. Its shores are high and rocky, indented by some slight bays; there is a fresh-water stream at the head, from which a bank extends about 3 cables. The depths vary from 13 to 30 fathoms, and there is a secure though rather limited anchorage, in from 13 to 16 fathoms, at the distance of half a mile from the head. Outside the entrance are several dangers, but none within, and the projecting points may be approached to a distance of one cable.

Haystacks, off the east side of the entrance, and 1⅔ miles north from the Sulivan reefs, are two bare, sharp-topped, cliffy rocks 65 feet high, and about 3 cables apart; at a distance of 2 cables from their west side are from 25 to 26 fathoms, and there is a clear deep passage between them and the Sulivan reefs; northward of them, rocks and foul ground exist.

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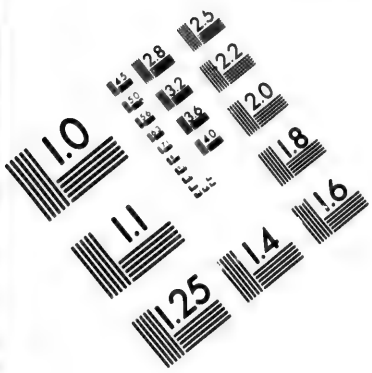
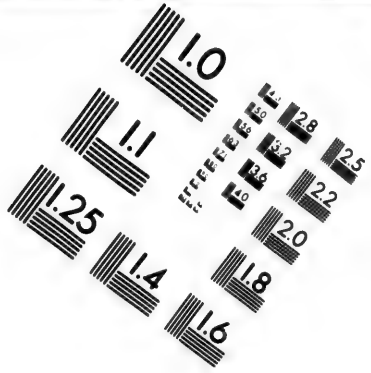
* *See* Admiralty plan:—Nasparti inlet, No. 716; scale, *m* = 1·8 inches.





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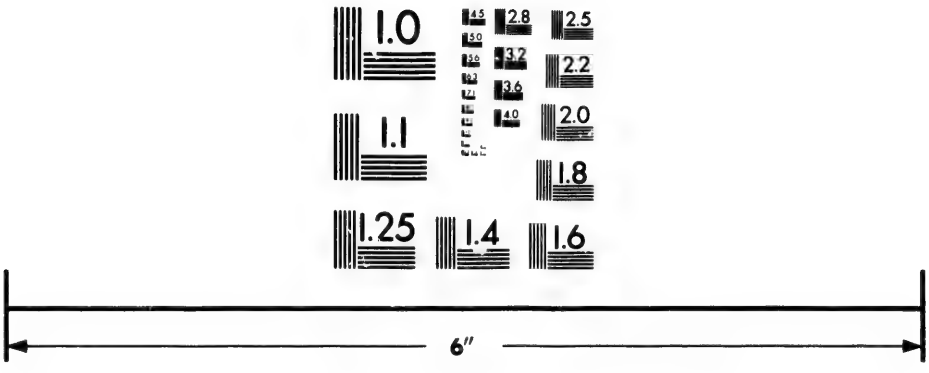

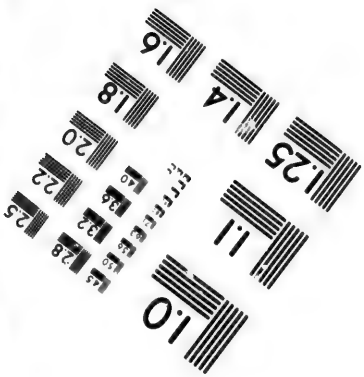

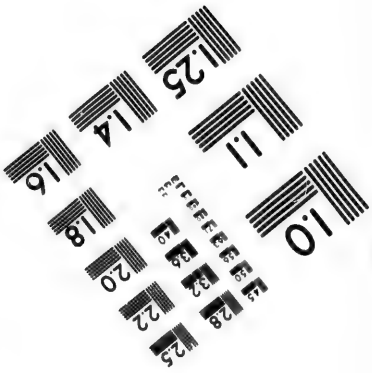

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East rock 3 cables from the east entrance point, is of small extent, has 17 fathoms at a distance of one cable to the westward of it, and covers at half flood; the Haystacks open south of Yule islet bearing S.E. by E., lead from 2 to 3 cables west of it.

Yule islet, about 40 feet high, lies midway between the Haystacks and East rock.

Mile rock breaker lies 1¾ miles from the west shore of entrance to the inlet, and 2 miles W. by N. ½ N. from Sulivan reefs. It is very dangerous to vessels entering the inlet, as it is of small extent and the sea only breaks on it in heavy weather; the depths around it are irregular, there being from 13 to 32 fathoms at 2 cables' distance from it.

Hat island, in the entrance of inlet, in line with a summit on the west side bearing North, leads 3 cables east of it, and well clear of the Sulivan reefs, into the inlet. No vessel should stand to the westward of this danger.

Mile rock, nearly one mile north of the above-mentioned danger, is a small bare rock, 12 feet above high water; there are 29 fathoms one cable east of it, and a deep clear passage between it and the west shore. A ledge, however, extends fully one cable from its north side.

Hat island, 70 feet high, lying in the centre of the inlet just within the entrance, is small, and has a few stunted trees on the summit; from the southward it is very conspicuous, and appears somewhat like a hat. It is steep-to on the east side, but nearly midway between it and the west shore is a shoal patch of 2½ fathoms, marked by kelp: when entering Nasparti inlet pass eastward of the island.

Directions.—Nasparti inlet should not be used by a stranger unless from necessity, as in thick or cloudy weather it might be difficult to make out the leading marks, and no one should attempt to enter unless they are well made out, especially as the sea only breaks on the outlying dangers in heavy weather, and they are seldom seen. A sailing vessel should, in passing the entrance of this and Ou ou kinsh inlet, keep Solander island open south of the land east of cape Cook bearing West.

If entering Nasparti inlet, keep Solander island (off cape Cook) in line with the land eastward of it bearing W. ¼ S., until Hat island comes in line with a summit on the west side of the inlet bearing North*, when steer in for the entrance on that bearing, which will lead 3 cables east of the Mile rock breaker, well clear of the Sulivan reefs, and half a mile west of East rock; pass one or two cables east of Hat island, and steer up the inlet in mid-channel, anchoring in 13 fathoms, about one-third of a mile from the head.

* *See* View on Admiralty chart No. 716.

Tides.—It is high water at full and change in Nasparti inlet, at 12 hours; springs rise 12 feet.

BROOKS PENINSULA.*—To the westward of Nasparti inlet is a peninsula of an oblong shape, 9 miles long, and about 5 miles wide, projecting into the ocean in a S.S.W. direction; its shores are for the most part very rocky, and rise almost abruptly from the sea to upwards of 2,000 feet; there are several off-lying dangers around it, some of which extend upwards of one mile from the shore.

Cape Cook or Woody point, the south-west extreme of this peninsula and the most projecting point of the outer coast of Vancouver island is 163 miles W. by N. ½ N. from the lighthouse on Tatoosh island, and 69 miles W. by N ½ N. from Estevan point. The cape rises abruptly from the sea to a summit 1,200 feet high.

At a distance of 2 miles from cape Cook and the south side of the peninsula the depths are from 20 to 90 fathoms, and as a rule no vessel should approach nearer.

Cape Cook is situated in latitude 50° 7′ 0″ N., longitude 127° 55′ 30″ W.

Banks reef, which covers at three-quarters flood, and on which the sea breaks heavily, lies 3 miles E.S.E. from cape Cook, and two-thirds of a mile distant from the south shore of the peninsula.

Solander island, nearly one mile west of cape Cook, is bare, 580 feet high, and has two sharp summits; between it and the cape the passage is choked up with rocks, and no vessel or even boat should go inside the island.†

BROOKS BAY, on the west side of Brooks peninsula, is a large open bay about 12 miles wide, and 6 miles deep; there are several dangers within it, and two inlets, Klaskish and Klaskino, which afford anchorage but are very difficult of access, and no vessel should attempt to enter either unless embayed and unable to get out of Brooks bay: the soundings are irregular, varying from 17 to 48 fathoms, shoaling generally to the northward.

Clerke reefs lie in the south-east part of the bay, 5 miles north from cape Cook, their outer extreme being 2½ miles off the east shore of the bay. They cover an extent of upwards of 2 miles, some are under water, others uncover, and no vessel should venture among them.

Cape Cook kept on a S.S.E. ½ E. bearing, leads 2 miles west of these reefs; and Small islet at the entrance of Klaskish inlet, in line with Leading cone at its head, bearing N.E. by E. ⅓ E., leads 1½ miles north.

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* *See* Admiralty chart:—Quatsino to Esperanza, No. 583; scale, $m = 0 \cdot 5$ inch.

† *See* View A. on Admiralty chart, No. 583.

KLASKISH INLET,* at the head of Brooks bay on the west side of Brooks peninsula, and 10 miles N.N.E. from cape Cook, is about 3 miles long in a north-easterly direction, and one mile wide at entrance; at its head is a long narrow basin, the entrance of which is too contracted for a vessel to enter. There is an anchorage just within the entrance to the inlet on the south side, to the eastward of Shelter island, but it is difficult of access to a sailing vessel.

Surge islets, on the south side of the entrance, 5½ cables distant from the shore, are small, rocky, and about 40 feet high; foul ground exists among them, and in entering the inlet a vessel should not approach their west side nearer than 4 cables.

Shelter island, just within the entrance of the inlet on its south side, is about half a mile in extent, 300 feet high, with a summit at each end covered with a few stunted trees; some rocks extend a short distance from its east and west sides, but the north shore is steep-to. The anchorage on its east side is about one-third of a mile in extent, with from 10 to 13 fathoms, well sheltered, but the bottom is irregular; the entrance to it, round the north-east side of the island, is less than one cable wide in the narrowest part. About one cable from the north-east point of Shelter is Bare islet, 15 feet high, which on entering the anchorage should be passed close to on its east side.

Between Shelter island and the north entrance point of the inlet is a heavy confused sea, which is dangerous for sailing vessels, as the wind generally fails there.

Directions.—Entering Klaskish inlet from the eastward and intending to anchor in the anchorage on the east side of Shelter island, do not bring cape Cook to the southward of S.S.E. ½ E., till Leading cone, a remarkable summit at the head of the inlet about 500 feet high, comes in line with Small islet on the north side of entrance bearing N.E. by E. ⅓ E.,† which mark will lead into the inlet well north of the Clerke reefs and Surge islets; when abreast the latter, haul a little to the eastward, so as to enter midway between Small islet and Shelter island; pass within one cable east of Bare islet off the latter's north-east point, and anchor in 13 fathoms with the extremes of Shelter bearing N.W. by W. ½ W. and S.W. ½ W.

Caution.—The entrance to this anchorage is intricate and narrow; and unless unavoidably necessary, no vessel larger than a coaster should attempt it, as a furious sea rages all around the outer parts.

Ship rock, lying 7½ miles N. by W. from cape Cook, 2 miles distant from the shore in the centre of Brooks bay, and midway between Klaskish

* *See* Admiralty plan :—Klaskish inlet, No. 590; scale, $m = 2{\cdot}0$ inches.

† *See* View B. on Admiralty chart No. 590.

and Klaskino inlets, is of small extent, and has from 17 to 20 fathoms close on its south and east sides; the sea generally breaks very heavily over it.

Leading mark.—Small islet in line with Leading cone N.E. by E. $\frac{1}{3}$E. leads $8\frac{1}{2}$ cables south of it; and Twenty-feet rock at the entrance of Klaskino inlet, in line with lower part of the stripe on Red Stripe mountain on the north shore of that inlet bearing N.N.E. $\frac{3}{4}$ E., leads 2 miles north-west of it.

Tides.—It is high water, full and change, in Klaskish inlet at 12h. 0m.; springs rise 12 feet.

KLASKINO INLET,* the entrance to which is in the north part of Brooks bay, 10 miles N. $\frac{3}{4}$ W. from cape Cook, is nearly 6 miles long in a winding direction to the E.N.E. Numerous rocks lie off the entrance, but there is a safe though intricate passage through them; and there is also a good anchorage on the south side, 2 miles within the inlet. The depths vary from 10 to 20 fathoms in the lower part of the inlet, increasing gradually towards the head to 40 fathoms; the inlet here becomes narrow, with high and rocky shores, terminating in low land at the head.

Nob point, the south entrance point of the inlet, is rocky, and covered with a few stunted trees, and close to its outer part is a rocky nob about 100 feet high. From Nob point a line of reefs above and below water with deep water between them extends fully $1\frac{1}{2}$ miles in a W.N.W. direction.

Twenty-feet rock, 4 cables W.N.W. from Nob point, is bare and 20 feet above high water. It is conspicuous from the outside, and there are 19 fathoms close to its north and west sides, but between it and Nob point the passage is choked up with rocks; the only channel into the inlet being to the westward of the rock, between it and the Channel reefs.

Two rocks on which the sea breaks at low water lie to the southward of the Channel reefs, and one mile distant from Nob point. The southernmost lies three-quarters of a mile S.W. $\frac{1}{4}$ W., from Twenty-feet rock.

Channel reefs, the south-east part of which is $3\frac{1}{2}$ cables W. by S. from Twenty-feet rock, are an irregular cluster of rocks mostly under water, extending in a westerly direction to the north-west shore of Brooks bay. There is deep water between them in many places, but the only safe passage into Klaskino inlet upwards of 3 cables wide with deep water is between their south-east part and Twenty-feet rock.

* *See* Admiralty plan :—Klaskino inlet, No. 590; scale, $m = 2{\cdot}0$ inches.

Anchorage island, in the middle of the inlet, about 2 miles within the entrance, is of small extent and rocky; some small islets extend one cable from its north-west and south-east points. The anchorage between the east side of this island and the shore is from 3 to 4 cables in extent, and well sheltered, with from 9 to 10 fathoms water: the entrance to it, round the south-east point of Anchorage island, is about one cable wide in the narrowest part, with from 13 to 17 fathoms in the middle.

Between Twenty-feet rock and the entrance to the anchorage are several dangers; a rock 3 feet high lies S.W. ¾ W. 8½ cables from the south-east point of Anchorage island, and another 2 feet high 3 cables S.W. ¾ S. from the same point, and there is a reef which covers one cable W. by S. ½ S. from the latter rock. These when entering the inlet must be passed to the northward.

Above Anchorage island some rocks extend nearly across the inlet, rendering it almost impossible for a vessel to go beyond them.

Red Stripe mountain, rising on the north side of entrance, abreast Anchorage island, is a remarkable conical-shaped summit 2,200 feet high, with a valley on either side of it; on its south part facing seaward is a conspicuous red cliffy stripe or landslip, easily distinguished from the outside; the lower part of it in line with Twenty-feet rock, bearing N.N.E. ¾ E., leads into the entrance south of Channel reefs, and 2 miles north-west of Ship rock.*

Directions.—Bound for Klaskino inlet, when outside Ship rock, bring Twenty-feet rock in line with the lower part of the red stripe on Red Stripe mountain bearing N.N.E. ¾ E., and run boldly for the entrance with that mark on, which will lead 2½ cables east of the eastern patches of the Channel reefs; keep on this course till within 2 cables of Twenty-feet rock, when haul a little to the northward, and pass it on its north side at one cable's distance, after which steer about N.E. by E. ½ E. for the centre or south part of Anchorage island, passing one cable or so north of the rocks off the south side of the inlet; when abreast the south-west point of the island, haul quickly to the eastward, round the rocks off its south-east point within half a cable, and anchor in from 9 to 10 fathoms midway between the east side of the island and the main, with the extremes of the former bearing N.W. and S.W. by W.: a large vessel should moor.

The entrance to Klaskino anchorage is even more intricate than that of Klaskish, and should not be attempted by a stranger unless absolutely necessary for safety.

Water.—Fresh water may be procured at both these anchorages.

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* *See* View A. on Admiralty chart No. 590.

Three miles from Klaskino, in the north-west part of Brooks bay, is a large rivulet where boats may enter and find shelter in bad weather.

Lawn point, the north-west extreme of Brooks bay, lies 12 miles N.W. by N. from cape Cook; it is low, and some rocks extend more than half a mile in an easterly direction from it, inside of which a boat may find shelter: the sea breaks violently about this point, and everywhere along the shores of Brooks bay.

The land in the vicinity of Lawn point appears very fertile, and lightly timbered; it rises gradually from the sea to a height of 1,900 feet. At a distance of 3 miles from the point are from 24 to 30 fathoms, and a vessel should keep a good offing.

Boat shelter.—Between the entrance to Klaskino inlet and Lawn point is a deep bay, in which are several islets and reefs; it is unfit for anchorage, being open to seaward, but at its head, north of May-day island, there is good shelter for boats.

Tides.—It is high water, full and change, in Klaskino inlet at 12h. 0m.; springs rise 12 feet.

QUATSINO SOUND,* the north-westernmost of the deep inlets on the outer coast of Vancouver island, is an extensive arm of the sea, which penetrates the island in a north-easterly direction for upwards of 25 miles. At the entrance between Reef point (on the south) and Entrance island, it is nearly 6 miles wide, narrowing to less than one mile at a distance of 5 miles within; the sound then takes a north-easterly direction, nearly straight for 13 miles, when it branches off in two arms, one (South-east arm) extending to the south-east for 12 miles, and terminating in low land. The other (West arm) lies to the northward, and is connected with the sound by a straight narrow pass about 2 miles long; it is 22 miles long in an east and west direction, and the eastern extreme, Rupert arm, is only 6 miles distant from Hardy bay on the north-east side of Vancouver island; the western part terminates within 12 miles of San Josef bay on the outer coast. Just within the entrance of the sound on the north side is Forward inlet, a much smaller arm, about 6 miles long in a northerly direction, in which are the best anchorages in the sound.

The shores of Quatsino sound are mostly high, and near the entrance very much broken; there are several small islands within and along its shores.

From the outside the entrance to Quatsino sound presents several remarkable features, which render it easy to be made out; along its south side are several rocks and small islands; and on both sides of, and within

* *See* Admiralty plan, Quatsino sound, No. 570; scale, $m = 2 \cdot 0$ inches.

the sound the land is high, some of the summits being very conspicuous. Among these are the Flattop and Entrance mountains to the northward of the entrance, and the Nose peak and Gap mountains inside; the Nose peak being easily distinguished from its sharp rocky summit.

The depths in the entrance, and from 3 to 5 miles outside, vary from 30 to 70 fathoms, but within they deepen in many places to upwards of 100 fathoms. There are several dangers along the south shore at the entrance; in the fairway are two very dangerous rocks, on which the sea only breaks in heavy weather, and it requires great caution on the part of the navigator to avoid them, when entering or leaving the sound.

Reef point, the south-east entrance point of the sound, 14 miles N.W. by N. from cape Cook, and 1½ miles from Lawn point the north-west extreme of Brooks bay, is low and rocky, but rises gradually to a well-defined summit, 1,900 feet above the sea: the coast between it and Lawn point forms a slight bay filled with a number of rocks extending a considerable distance from the shore.

Boat cove, into which flows a small stream (Culleet river) in which a boat can enter, and find shelter in bad weather, is a small bight on the south shore of the sound, 5½ miles North from Reef point; the coast between the two places is indented by several bays, and fringed by a barrier of reefs, which extend in many places nearly one mile from the shore, and over which the sea usually breaks very heavily.

Bold bluff, 7 miles north from Reef point, on the south side of the sound, is, as its name implies, a bold rocky salient bluff rising suddenly to upwards of 200 feet, when it slopes gradually to a summit 1,609 feet high; it may be safely approached to within a distance of one cable. At this spot the sound contracts to less than one mile in breadth.

The shore between Boat cove and Bold bluff is rocky, but apparently steep-to, and clear of danger.

Surf islands, 1½ miles S.S.W. from Bold bluff, and 3 miles within the entrance to Quatsino sound, are a chain of small islands, nearly one mile long in a north-west and south-east direction, some of which are covered with a few stunted trees, and are about 40 feet above high water; a short distance from them are a number of rocks on which the sea breaks, but 3 cables from their south and west sides are from 10 to 30 fathoms. Although there appears to be deep water between these islands and the east side of the sound, it is not advisable to use that passage, as it has not been sufficiently examined.

Entrance island, 5½ miles N.W. ½ N. from Reef point, at the north-west entrance point of the sound is small and rocky, about 140 feet

high, and covered with a few stunted trees. It is steep-to on its south-east side, which may be approached to 2 cables distance; to the northward of it is a narrow boat pass into the sound, about one cable wide, but filled with rocks.

Danger rocks, on the north shore of the entrance, nearly in the fairway, are two very dangerous pinnacle rocks, of small extent, half a mile distant from each other in a north-west and south-east direction, and steep-to on all sides. The south Danger rock is awash at low water, and lies one mile east from the south extreme of Entrance island; the north Danger rock is 7 cables distant from the same island, and breaks at low water; there is deep water between the rocks. The sea very seldom breaks on these rocks, great caution is therefore required, when entering or leaving the sound, to avoid them.

Leading marks.—Pinnacle islet in line with the east point of Low islets, in Forward inlet, bearing N.N.W. $\frac{3}{4}$ W., leads nearly 4 cables west of Danger rocks, and midway between the north rock and Entrance island.

Robson island in Forward inlet, open north of Entrance Mount point bearing N.W. by W. $\frac{1}{4}$ W., leads 3 to 4 cables east of Danger rocks; and Village islet, on the east side of Forward inlet, just touching Brown point bearing N.W. leads about three-quarters of a mile east of them, and midway between them and the Surf islands.*

Bold bluff in line with the gap in the centre of of Surf islands, bearing N. by E. $\frac{3}{4}$ E., leads nearly 8 cables south-east of the south Danger.*

Between the Danger rocks and Surf islands, the passage is $1\frac{1}{2}$ miles wide, and clear of danger.

FORWARD INLET, on the north side of the sound, is one mile wide at the entrance, and about 6 miles long; it first takes a north-westerly direction for 2 miles from its outer part, then turning to the N.N.E. for 4 miles it contracts in breadth, and becomes shoal at the head, terminating in large salt-water lagoons; in the upper part it contracts to less than a quarter of a mile in width in some places: there are two anchorages within it, North and Winter harbours, the former easy of access to sailing vessels, and both are very secure and well sheltered.

Entrance and Flattop mountains, on the west side of Forward inlet near the entrance, are very conspicuous objects from seaward; the former is 1,275, and the latter 960 feet high.

Pinnacle islet, three-quarters of a mile north of Entrance island and 2 cables distant from the south-west entrance point of Forward inlet,

* *See* Views on Admiralty chart No. 570.

is a small jagged rock about 40 feet high, with a few trees on its summit. There are 15 fathoms at one cable's distance from its east side.

A shoal patch of 8 fathoms lies in the fairway to the inlet, 6 cables E.N.E. from Pinnacle islet; any vessel may go over it.

Robson island, in the bend of Forward inlet on the west side, 1½ miles from Pinnacle islet, is about half a mile in extent, and 385 feet high; its shores are rocky, but, at a distance of one cable, free from danger on its north and east sides. Between it and the west shore is a narrow passage of 2 to 5 fathoms water.

Low islets, 4 cables south-east from Robson island, are small wooded islands which are steep-to on all sides.

Village islet.—A small village is situated on the east side of Forward inlet abreast Robson island, and close off it is Village islet, a small bare islet about 40 feet high, which is rather conspicuous.

Bare islet, lying off the north-east entrance point to Forward inlet, is about 12 feet high, and steep-to on the outside; it is 1½ cables distant from the shore, but the passage inside is only fit for a boat.

Burnt hill, 1,095 feet high, just over Brown point, the north-east entrance point of Forward inlet, is remarkable from the southward, being bare of trees and cliffy on its south side; one mile north-east from it is Nose peak, another conspicuous summit, 1,730 feet high, with a bare rocky top.

NORTH HARBOUR, which lies to the north-west of Robson island, in a bight on the west side of Forward inlet, is a snug and secure anchorage, about 4 cables in extent, with from 4 to 6 fathoms. The entrance is 3 cables wide, rendering the harbour easy of access to sailing vessels; it is perhaps the best anchorage within the sound, and from being only 4 miles within the entrance is very convenient. Browning creek, in its west part, extends 1¼ miles to the westward, and is very narrow, with from 2 to 5 fathoms water in it, terminating in a shallow basin, dry at low water.

Observatory rock, which lies on the north side of the entrance to North harbour, is a small bare rock, connected at low water to the mainland.

WINTER HARBOUR comprises that part of Forward inlet which runs in a N.N.E. direction, and is a capacious anchorage with from 8 to 11 fathoms. Its shores are low and bordered by a sandy beach, and the harbour becomes shoal at a distance of one mile from the head; its breadth varies from 2 to 6 cables.

Log point, just outside the entrance to this harbour on the east side, is low, and bordered by a sandy beach; to the southward of it, and extending 4 cables from the shore, is the New bank, with 3½ fathoms on the shoalest

part, and contracting the breadth of the entrance passage to the harbour to less than one cable between it and a shoal spit extending from the opposite shore; but by keeping a little over to the west side when abreast North harbour, a vessel may avoid this bank, and enter Winter harbour without danger.

At the narrowest part of the entrance to Winter harbour, above Log point, on the west side, is a low grassy point bordered by a sandy beach which is steep-to, there being 16 fathoms within half a cable of it.

Pilley shoal of 3 fathoms, on the north side of Quatsino sound, is of small extent, steep-to on the outside, and marked by kelp. It lies 1½ cables distant from the shore, and one mile west from Bold bluff.

Boat cove, on the north side of the sound, is of small extent, with 5 fathoms inside; it would afford good shelter for a small craft; the north shore of Quatsino sound between it and Bare islet is rocky and very much broken.

Bedwell islets, lying 5½ miles within the entrance, off a projecting point on the north side of the sound, are of small extent, wooded, and separated from the shore by a very narrow boat pass, which is conspicuous from the entrance.

Monday shoal, at 3 cables north-east of them, has 4 fathoms on it, is marked by kelp, and steep-to on the outside: eastward of Bedwell islets no sea is ever experienced in the sound.

Tides.—It is high water, full and change, in Quatsino sound at 11 hours; springs rise about 11 feet.

KOPRINO HARBOUR,* 8 miles within the entrance, in the centre of a bay on the north side of Quatsino sound, is a perfectly land-locked but small anchorage, affording room for one or two ships to lie moored within. It lies to the northward of Plumper island, which is about half a mile in extent, low, wooded, and steep-to on all sides, there being a good passage on either side of it into the harbour.

Dockyard island, in the west part of the harbour, mid-way between Plumper island and the north shore, is small, but may be approached close to; a ledge, the greatest depth on which is 4 fathoms, connects it with Plumper island.

Mud bank, about 1½ cables north-east from Dockyard island, in the middle of the harbour, is a small patch of 15 feet; there is good anchorage one cable south of Dockyard island, in 14 fathoms.

Wedge island lies at the eastern limit of the anchorage, about one cable north of Plumper island; it is very small, and covered with a few

* *See* plan of Koprino harbour on Admiralty chart No. 570; scale, $m = 6{\cdot}0$ inches.

bushes, a ledge extends a short distance from it to the westward; there is a deep passage close to on either side of it into the harbour.

Observatory islet, at the north-east extreme of the harbour, is bare and about 12 feet high; it is 2 cables north of Plumper island, and 3 cables from the north shore, connected to the latter by a bank which dries at low water.

East passage, leading into Koprino harbour, eastward of Plumper island, is half a mile wide at entrance, narrowing to 2 cables at its termination, is clear of danger, and the depths in it vary from 15 to 30 fathoms.

East cove, the head of the bight between Observatory islet and Prideaux point in the north-east part of East passage, appears to afford a good anchorage in 6 to 10 fathoms; but the entrance to it has hardly been sufficiently examined to recommend its being used by a large vessel.

Prideaux point, the east entrance point of East passage, is low, bordered by a sandy beach, and may be approached to a distance of one cable. The north shore of the sound from Prideaux point takes a general north-easterly direction for 9 miles to Coffin islet, at the entrance of Hecate cove. It is bordered by a sandy beach, and is clear of danger at the distance of one cable, except in the vicinity of the Percy ledge, which lies 6 miles from Prideaux point, is 2 cables from the shore, and has 4 fathoms on its outer edge.

From Bold bluff the south shore of the sound runs nearly parallel to the northern for 13 miles in a north-easterly direction. It is high and indented by two bays of considerable size, and some small creeks none of which afford anchorage. In Koskeemo bay, at 2 miles within Bold bluff, is a native village of considerable size.

Village islands, at the east extreme of Koskeemo bay, are of small extent and low; their outer part is steep-to.

Brockton island, lying 2 cables from a projecting point on the south side of the sound, 7 miles north-east from Bold bluff, is nearly half a mile long, but narrow; its west side is steep-to.

Limestone island, 15 miles within the entrance, and in the centre of the sound, is the largest island in the sound, and shaped somewhat like a crescent, nearly 3 miles long, and about three-quarters of a mile wide in the broadest part. Its shores are rocky, but clear of danger, and the island is of moderate height; Quiet cove, on its north-west side, is small, and affords anchorage for small craft.

Foul islets, lying midway between Holloway point, the south-west extreme of Limestone island, and the south shore of the sound, are small,

and about 3 cables in extent in an east and west direction. There is a clear deep passage, about 2 cables wide, on either side of them; the south passage is to be preferred.

Single islet, half a mile north-eastward from Holloway point, and 3 cables north of the Foul islets, is low and bare, but may be approached to the distance of one cable.

Kultus cove, abreast Limestone island, on the south side of the sound, is about half a mile in extent, with irregular soundings of from 12 to 25 fathoms; it affords no anchorage, except for small craft.

SOUTH-EAST ARM, the entrance to which is one mile east of Limestone island and 18 miles within the entrance of the sound, is 10 miles long in a south-easterly direction, and varies in breadth from 3 cables to one mile. Its shores are generally high and rugged, but terminate in low land at the head; the depths in it vary from 30 to 70 fathoms, and there is no anchorage, except for small craft; a bank dries off 2 cables from the head, and close to its edge is 15 fathoms.

Mist rock, 5 miles within the entrance, and 4 cables from the east shore, is of small extent, and covers at half flood; it is the only danger in the south-east arm, but by keeping in mid-channel or well over to the west shore, a vessel will clear it.

Atkins cove, on the east side of entrance to the South-east arm, is 4 cables long in a northerly direction, and one cable wide, with from 5 to 7 fathoms; there is room for a small vessel to anchor in it, but the cove is open to the south-east.

Whitestone point, at the separation of the two arms at the head of Quatsino sound, is a rocky point of moderate height, and lies three-quarters of a mile north-east from Limestone island, and abreast Coffin islet. Bull rock, which covers, and is marked by kelp, lies 3 cables south from Whitstone point, and 2 cables distant from the shore. Between Atkins cove and Whitestone point the coast is rocky, and should not be approached nearer than 3 cables.

HECATE COVE,* on the north shore about one mile north-east of Coffin islet, indents the shore about two-thirds of a mile in a north-westerly direction, is from 2 to 3 cables wide, and affords good anchorage near the centre in 9 to 11 fathoms. The entrance is clear of danger, but in the inner part of the cove, near the north side, are some shoal patches, marked by kelp, with only 11 feet water in some parts; the shores of the cove are moderately high, and bordered by a sandy beach.

* *See* plan of Hecate cove on Admiralty chart No. 570; scale, $m = 6 \cdot 0$ inches.

This cove is convenient for steamers or small craft, and a vessel ought to anchor in about 11 fathoms, with the entrance points bearing South and S.E.; a large vessel should moor.

Kitten island, at the east side of entrance, is steep-to on the outside.

Round island, (Quatishe,) nearly in mid-channel, about one mile east of Hecate cove and just south of Quatsino narrows, is small, and of moderate height; there is a clear passage between it and the north shore, but the one south of it is filled with rocks. At 3 cables south-east from it is Bight cove, of moderate extent, with from 8 to 10 fathoms inside, but as the tide runs strong off the entrance, and there are also some rocks, it is only recommended for small craft.

Quatsino narrows, 20 miles inside the sound and connecting it with the Rupert and West arms, are 2 miles long in a northerly direction, and 1½ cables wide in the narrowest part; the depths in it vary from 12 to 20 fathoms, its shores are high and rocky, but at half a cable's distance clear of danger. Turn point, at the south-west extreme of the narrows, is bold and cliffy, the coast turning sharply round it to the northward; a short distance off it are some strong tide rips. Between this point and Hecate cove the coast is broken, but clear of danger at the distance of one cable.

Tides.—The tide runs through these narrows at a rate of from 4 to 6 knots, and the streams turn shortly after high and low water.

Philip and James points, at the north extreme of the narrows, are bold and steep-to; off the latter, which lies on the east side, is a small island.

RUPERT ARM, to the north-east of Quatsino narrows, is 5 miles long in a north-easterly direction, and nearly one mile wide; its shores are high and clear of danger; its head terminates in low land, and a bank dries off it for 2 cables. The depths in this arm vary from 80 to 30 fathoms, shoaling gradually to the head, off which a vessel may anchor, in 14 to 17 fathoms, a short distance from the edge of the bank.

Marble creek, which lies half a mile east of the narrows, at the entrance of Rupert arm, is of small extent, and affords anchorage in from 5 to 6 fathoms; off its head a sand-bank extends 4 cables, and midway up the creek are some small islets on either side: if intending to anchor, pass between and go just inside them.

From Rupert arm to Hardy bay, on the north-east side of Vancouver island, is a distance of only 6 miles, and a trail exists between the two places, much frequented by the natives for trading purposes to fort Rupert, which was until lately a station of the Hudson Bay Company.

Hankin point, abreast Quatsino narrows on the north side, is bold and rocky; it separates the Rupert from the West arm.

WEST ARM trends in a westerly direction nearly 18 miles from the north part of Quatsino narrows, and varies in breadth from 2 cables to one mile. Its shores are mostly high and rocky; the northern one is indented by several small bays, and off it are some rocks and small islands. The depths vary from 15 to 96 fathoms, shoaling gradually to the head, and there are two anchorages, one at Coal harbour on the north side, and the other at the edge of the bank extending from the head; the former is of moderate extent, and the best anchorage northward of the narrows.

Coal harbour, 2 miles from the narrows, on the north side of West arm, is of square shape, from 3 to 4 cables in extent, and affords good anchorage near the middle in from 12 to 14 fathoms. The shore is bordered by a sandy beach, and at the head are some fresh-water streams. This anchorage is easy of access for any vessel; indications of coal have been met with in this vicinity. It was at one time worked, to a small extent.

Pot rocks, which lie 2 miles west from Coal harbour, and 3 cables distant from the north shore, are of small extent, and cover at three-quarters flood; there are 64 fathoms 3 cables south of them.

Straggling islands, about 5 miles from the narrows, are an irregular group of small islands and rocks extending upwards of half a mile from the north shore; the depths among them and to the northward are irregular, and a vessel in passing should not approach their south side nearer than 2 cables; just west of them on the north shore is a small patch of swampy ground, through which flow some fresh-water streams, and a bank extends one cable from it.

The West arm gradually decreases in breadth to the westward of the Straggling islands, and the shores on both sides at the distance of one cable are clear of danger; the head terminates in low land, and a bank extends upwards of 2 cables from it; close to the outer edge of the latter are from 12 to 14 fathoms, where a vessel may anchor.

Directions.—Entering Quatsino sound from the southward, give Reef point, its south-east entrance point, an offing of about 2 miles, and steer North till Bold bluff comes in line with the gap in the centre of the Surf islands, bearing N. by E. ¾ E.,* (*see* page 339), which mark kept on will lead south-east of Danger rocks; when the west side of Robson island comes open north of Entrance mount point in Forward inlet,* bearing N.W. by W. ½ W., or Village islet, on the east side of that inlet, is just touching Brown point, bearing N.W.,* a vessel will be well east of these rocks. If bound up the sound, round the north end of Surf islands at

* *See* Views on Admiralty chart No. 590.

a distance of about half a mile, or if going to Forward inlet, steer about N.W. by W., taking care not to shut in the south side of Robson island with Entrance mount point, until Bedwell islets come open north of Bold bluff bearing N.E., when she will be well north of the Danger rocks. Pass from one to 2 cables off the east sides of the Low islets and Robson island, and rounding the north point of the latter, at the same distance, enter North harbour, and anchor in from 4 to 6 fathoms near its centre.

If intending to anchor in Winter harbour, when abreast the north part of Robson island, steer N.N.W., keeping well over to the west shore to avoid the New bank (*see* page 340), and when past it enter the harbour in mid-channel, anchoring in 11 fathoms about half a mile north of Grass point. Winter and North harbours are the best anchorages in the sound, and easily available for sailing vessels, which could beat into the latter, and from being situated near the entrance their position is very advantageous.

Bound to Koprino harbour, which can only be entered by steamers or sailing vessels with a fair wind, round the north-west point of Surf islands at about half a mile distance, and steer up the sound in mid-channel until abreast the harbour. If in a large vessel, go through the East passage, keeping from one to 2 cables from Plumper island; enter the anchorage close to on either side of Wedge island, and moor immediately the vessel is west of it (with anchors north and south); a vessel may also enter by West passage, and anchor in 14 fathoms south of Dockyard island.

When navigating the sound to the eastward of Koprino harbour the chart is indispensable, but a mid-channel course is everywhere free of danger; sailing vessels of any size should not, however, go eastward of that harbour, as the anchorages beyond are rather difficult of access for them. If wishing to anchor in Hecate cove, enter it in mid-channel, passing north of Limestone island, and moor immediately the vessel is inside the entrance points; the tide runs from one to 3 knots abreast the entrance, and should be guarded against.

Going through the Quatsino narrows, keep well over to the north shore, pass north of Round island, round Turn point close to, and guarding against tide, steer up the narrows in mid-channel; these narrows should only be attempted at slack water or with a favourable tide, unless in a full-powered steamer. The best anchorage north of the narrows is Coal harbour, and if wishing to go there, a north-west course for 2 miles from the narrows will lead to its entrance, and a vessel may anchor near the centre in from 12 to 14 fathoms. In navigating the West arm keep well over to the south shore, when in the vicinity of the Pot rock and Straggling islands.

From westward.—Entering Quatsino sound from the westward, keep an offing of about 2 miles, till Entrance island bears N.E. or N.E. by N., when steer to pass about 2 cables east of it, but not further off. When abreast it haul to the northward, bringing Pinnacle islet in line with the east side of Low islets, bearing N.N.W. ¾ W., and steer up with that mark on till Bedwell islets come well open north of Bold bluff, bearing N.E., when enter Forward inlet, or proceed further up the sound, as before directed.

If, when coming from the southward, Pinnacle and Low islets can be well made out, a vessel by keeping the former in line with the east part of the latter, bearing N.N.W. ¾ W., will pass 3 cables west of the Danger rocks; but as a rule it would be more prudent to pass eastward of them.

If the weather be so thick that the marks for clearing the Danger rocks cannot be distinguished, a vessel, if able to distinguish Entrance island, may enter the sound by steering for it on a N. by E. or north-easterly bearing; pass close to its east side, and haul to the northward when abreast it; by keeping half a mile on that course, she will be well clear north-west of the Danger rocks, and may proceed anywhere up the sound. On a clear night in fine weather a vessel may also enter in the above manner.

There is room, with a steady breeze, for a smart working vessel to beat into the sound to the southward and eastward of Danger rocks, though without previous knowledge of the place it would be rather hazardous to attempt it. If obliged to do so, when standing to the northward towards the Danger rocks, tack when Bold bluff comes in line with the centre of the northernmost (wooded) Surf island, bearing N.N.E. ½ E.; and in standing to the south shore, tack when Bold bluff comes in line with the south-east extreme of the Surf islands bearing N. ¾ E. or N. by E. When the south side of Robson island comes open north of Entrance mount point, N.W. by W. ½ W., she will be eastward of the Danger rocks, and may stand further to the northward.*

Beating between Surf islands and Danger rocks, tack at about 3 cables of the former; and in standing towards the latter keep Robson island open as before directed, till Bedwell islets comes open north of Bold bluff, N.E.; if going to North harbour, when inside Forward inlet, guard against the New bank.

The COAST of Vancouver island from Quatsino sound to cape Scott, the north-west extreme of the island, takes a general W.N.W. direction; it is mostly rocky and iron-bound, indented by several bays, most of which

* *See* Views on Admiralty chart No. 570.

are small, and from the projecting points some rocks extend in some places nearly one mile from the shore. At a distance of 2 miles off are from 20 to 30 fathoms, sand and rock, deepening to 100 fathoms at 10 to 11 miles off shore; to the southward of the Scott islands the 100-fathoms line does not appear to extend more than 6 miles from them.

Caution.—When navigating between cape Scott and Quatsino sound do not approach the shore nearer than 2 miles.

Ragged point, 3 miles from the north entrance point of Quatsino sound, is a rocky, rugged point, of moderate height, with 12 fathoms at half a mile outside it. Open bay, which lies just inside it, affords landing for boats in fine weather on its east side.

The coast between Open bay and the entrance to Quatsino sound is high and cliffy; some rocks extend nearly one mile from it.

Top-knot point, 5 miles north-west of Ragged point, is low, with a summit 300 feet high, shaped like a top-knot, just within it; some rocks extend half a mile to the southward from it.

Raft cove, 8 miles from Ragged point, is an open bight about one mile in extent, and affords no shelter whatever.

Cape Palmerston, 11 miles north-west from Ragged point, is a bold rocky point rising to a summit 1,422 feet high; some rocks extend half a mile from it.

SAN JOSEF BAY, the entrance to which is 14 miles north-west from Ragged point and 8 miles south-east from cape Scott, is an extensive open bay, 3 miles deep in a north-easterly direction; the breadth at the entrance is nearly 2 miles, narrowing gradually towards the head. Its shores are high, and off the south side are several off-lying rocks; the depths vary from 11 to 4 fathoms, but the bay affords no shelter except with northerly winds, and should only be used as a stopping place in fine weather; generally a heavy sea sets into it, and a vessel caught there with a south-westerly gale would inevitably go on shore. At the south side of the head of the bay is a fresh-water stream of considerable size, which boats can enter at high water, and find shelter in.

Directions.—Intending to anchor in the bay, bring the entrance to bear N.E., and steer for it, anchoring in 7 or 9 fathoms near the middle, with the entrance points bearing South and West.

Sea Otter cove, just west of San Josef bay, is about one mile long in a northerly direction, and from 2 to 3 cables wide. There are 5 fathoms in the entrance, and from one to 3 fathoms inside it, also several rocks; the shelter within is very indifferent, and the place only fit for a coaster. Off its south-east entrance point, and separating the cove from

San Josef bay, are some small islets extending nearly one mile from the shore; they are bare and yellow-topped, about 40 feet high, and conspicuous from the north-west.

CAPE RUSSELL, 16 miles from Ragged point and immediately westward of Sea Otter cove, is a remarkable headland 870 feet high, and the outer part of a peninsula formed by Sea Otter cove and a small bay north west of it; some rocks, on which the sea breaks very heavily, extend nearly one mile south from the cape.

From cape Russell to cape Scott the coast, from 500 to 600 feet high, trends in a north-westerly direction and is indented by three open bays which are nearly one mile deep but afford no shelter whatever.

CHAPTER IX.

COAST OF BRITISH COLUMBIA (INNER CHANNELS)—QUEEN CHARLOTTE SOUND TO SEAFORTH CHANNEL.

VARIATION in 1888.

Queen Charlotte sound, 24° 30′ E. | Seaforth channel, 25° 30′ E.

The Inner channels, herein described, of the seaboard of British Columbia afford smooth water, together with anchorages at suitable distances, for vessels of moderate length.

These channels, therefore, offer facilities to steam vessels for avoiding the strong gales and thick weather so frequently met with in Hecate strait. They are also available for fore-and-aft schooners, when navigating between Vancouver island and Alaska.

Unless directed to the contrary, the mid-channel course is recommended to be kept when navigating these inner waters.

CAPE CAUTION (Ka klees la), the north-west entrance point of Queen Charlotte sound, is of moderate height and level, the tops of the trees being about 200 feet above the sea; the shore is white, and of granite formation, with a few rocks off it; the land north-east of the cape rises gradually in a distance of 5 miles to Coast nipple, 1,350 feet high, 2 miles to the eastward of which lies mount Robinson, 2,100 feet high.*

Soundings.—In a south-westerly direction, from cape Caution, at a distance of 3 cables there is a depth of 9 fathoms, rocky bottom; at one mile, 16 fathoms; at $1\frac{3}{4}$ miles, 43 fathoms, white sandy bottom; thence for 7 miles in the same direction the average depth is 70 fathoms, rocky bottom. At 10 miles S.W. by W. from the cape and $2\frac{3}{4}$ miles S.E. $\frac{1}{2}$ S. from Danger shoal, the water shoals to 40 fathoms dark sand, and again deepens to 80 and 90 fathoms a short distance to the southward.

Cape Caution is situated in latitude 51° 9′ 39″ N., longitude 127° 48′ 5″ W.

SEA OTTER GROUP,† consisting of several dangerous rocks, islets, and shoals which cover a space of about 12 miles in extent north and

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* *See* Admiralty charts:—Vancouver island, and views, No. 1,917; scale, $m = 0{\cdot}15$ of an inch. Cape Caution to port Simpson, southern portion, No. 1,923 b; scale, $m = 0{\cdot}25$ of an inch.

† *See* Admiralty chart:—Approaches to Fitzhugh and Smith sounds, No, 2,448; scale, $m = 1{\cdot}0$ inch.

south and 10 miles in an east and west direction, lies at a distance of 6 or 7 miles from the seaboard of British Columbia, fronting the coast between capes Caution and Calvert.

Danger shoal, on which the sea is reported to break in heavy weather, is the southernmost outlying danger of Sea Otter group, and lies W. by S. ½ S. 10½ miles from cape Caution; near the centre of this shoal a depth of 9 fathoms, rocks and stones, was obtained, with 22 fathoms close around. Shoaler water probably exists.

Virgin rocks, near the western limit of the group, consist of three white rocks, the largest of which (50 feet high), lies N.W. by W. ½ W., 7½ miles from Danger shoal, and West 17 miles from cape Caution. Southward of these rocks the 30-fathom line is 4 miles, and in a westerly direction it is 6 miles distant: rounding the rocks a vessel should not stand into less than 30 fathoms.

Watch rock, 74 feet high and black, lies near the northern limit of the group, 7¼ miles N. ¾ E. from Virgin rocks. The rock is steep-to.

Pearl rocks, the northernmost of Sea Otter group, comprise several rocks above and below water, extending 1½ miles in a north-west and south-east direction; the largest rock (15 feet high) lies E. by N. 3 miles from Watch rock, and the south-east rock, on which the sea always breaks, lies one mile S.E. by E. from the largest rock; there are 15 to 31 fathoms water, close-to on the north side of Pearl rocks; and 70 to 80 fathoms just eastward of them.

Devil rock, the north-eastern outlying danger, lies 1¼ miles N.E. ½ E. from the largest Pearl rock; and nearly 3 miles S.S.W. ½ W. from Sorrow islands. The sea seldom breaks on Devil rock, and there is apparently deep water close around. There are from 80 to 40 fathoms between the rock and cape Calvert.

New patch, on which the sea generally breaks, is nearly 2 miles in extent, and lies 4½ miles S. by E. from the largest Pearl rock.

Channel reef, the easternmost danger of Sea Otter group, has about 6 feet over it at low water; from the centre of this reef, Table island, at the entrance of Smith sound, bears E. by N. ½ N. 4¾ miles, and Egg island E. ¼ N. $4\frac{9}{10}$ miles. The sea seldom breaks on Channel reef, and there are 60 fathoms close eastward of it.

Hannah rock, the south-easternmost outlying danger, on which the sea nearly always breaks, is situated about 2¾ miles south of Channel reef; Hannah rock is awash at high water, and from its centre, cape Caution bears E. ½ S. 8 miles, Egg island N.E. by E. 5 miles, and Danger shoal S.S.W. ¼ W. $4\frac{7}{10}$ miles.

Clearing mark.—The south extremes of Egg and Table islands in line, bearing N.E. ¾ N. leads clear to the south-eastward of Danger shoal and all other dangers on the south-east side of Sea Otter group.

Caution.—Dangerous rocks have been reported as lying in a S.W. by S. direction, 5 miles from Danger shoal, and occupying a space of 2½ miles in diameter; but their existence is doubtful.

SOUTH PASSAGE, leading to Smith and Fitzhugh sounds from the southward, lies between cape Caution and the south-east limit of Sea Otter group, where it is about 7 miles broad, with irregular depths varying from 34 to 74 fathoms. False Egg island, its own breadth open west of Egg island, bearing N. ½ W., leads through South passage, nearly in mid-channel.*

Blunden bay, a slight bend in the coast between cape Caution and Neck point, at 1½ miles N.W. ½ N. from the former, is about one mile wide at its entrance, and nearly one mile deep. Indian cove, which lies in the northern part of this bay, affords good shelter for boats, it is the rendezvous for Indians on their canoe voyages, when passing between Queen and Fitzhugh sounds.

Hoop reef.—From Neck point the coast trends N. by W. 2 miles to Good Shelter cove, midway between which lies Hoop reef, about one-third of a mile from the shore; this reef is three-quarters of a mile in extent north-west and south-east, and one-quarter of a mile broad.

South Iron rock on which the sea seldom breaks, lies three-quarters of a mile to the westward of Hoop reef, and nearly 1¾ miles N.W. ½ W. from Neck point; there are 35 fathoms close to, on the north side of the rock, and 25 fathoms in the channel between it and Hoop reef.

North Iron rock, which dries 7 feet, lies nearly in the fairway of Alexandra passage, three-quarters of a mile N.N.W. ¼ W. from South Iron rock; there are 7 to 9 fathoms close to, and no bottom at 40 fathoms within a quarter of a mile of North Iron rock.

Clearing marks.—False Egg island in line with West rock off Table island, bearing N. by W. ⅓ W., leads 4 cables west of South and North Iron rocks. The west extreme of Surf islet, and the small islands near the south point of Shower island in line bearing N.E. by N., leads through Alexandra passage, between North Iron and Egg rocks.

EGG ISLAND, immediately fronting Smith sound, and standing boldly out from the coast, is the prominent landmark between Goletas channel and Fitzhugh sound. The island is 280 feet high, covered with

* *See* View A on Admiralty chart No. 2448.

trees, and is remarkable for its egg-like shape; it lies 5 miles N.W. ¼ N. from cape Caution. From the south-west side of the island rocks extend about one cable, and on the east side is a small island, which is separated from Egg island by a narrow gully, giving the appearance of a split in the island itself, when seen from north or south.

Egg rocks, on the west side of Alexandra passage, are a cluster of rocks lying nearly three-quarters of a mile W.N.W. from North Iron rock, and about 2 cables S.S.E. from Egg island; these rocks extend about a quarter of a mile N.N.W. and S.S.E., the northernmost being 30 feet high.

Denny rock, a sunken danger on which the sea seldom breaks, and a source of danger in thick weather, lies a quarter of a mile W.S.W. from the southernmost Egg rock. The west extreme of Ann island open west of Egg island bearing N. by E. leads about 3 cables west of Denny rock.

SMITH SOUND, 6 miles N.N.W. from cape Caution, is about 8 miles long N.E. and S.W., with an average breadth of 3½ miles; the entrance between Jones and Long points being 4½ miles across in a N.N.W. direction. At 6 miles within the entrance, on either side of a cluster of islands is a channel leading into Smith inlet. In almost every part of the sound the depths are over 40 fathoms, and there is generally a heavy swell.

The south-east shore of Smith sound, for a distance of 4 or 5 miles from the entrance, is skirted by several small islands and rocks having deep water close-to; good shelter for boats will be obtained in a small cove about a quarter of a mile north of Jones point, the south entrance point of the sound; also in a cove one mile south of Jones point, abreast Egg rocks.

The entrance to the sound is protected by a rocky plateau (Cluster reefs) and several islands, islets, and rocks; some above, and many under water, prominent amongst them being Egg and Table islands. Access to Smith sound may be had on either side of these islands.

Alexandra passage, the continuation of South passage into Smith sound lies between Egg island and the south-eastern point of entrance; the narrowest part between Egg rocks and North Iron rock being 6 cables; here as elsewhere, however, the dangers are so steep to that the *quickest* use of the lead is enjoined. A general leading mark through Alexandra passage (making allowance for heave of swell and tide) is the west extreme of Surf islet in line with the islets near the south point of Shower island bearing N.E. by N. (*see* page 352).

Beaver passage.—The northern channel into Smith sound lies between the islands skirting the north point of the sound, and Wood and White rocks, the northern and north-western extension of the above-mentioned plateau. In Beaver passage the bottom is irregular, 20 fathoms being the least depth obtained. The course through the passage is E. ¼ S., the east extreme of Search islands just open of the west end of Surf islet on that bearing, leads in midway between John reef (on south side) and False Egg island (on north side) where the width is 6 cables. This western entrance to the passage being the narrowest part; with the usual amount of sea or swell, good steerage, and vigilant attention are required.

White rocks, 35 feet high, and very conspicuous, lie in the west entrance of Beaver passage, at 3¼ miles N. by W. ¼ W. from Egg island, and nearly one mile north-west of Cluster reefs.

John reef.—At 3 cables N.N.W. ¾ W. from White rocks, and 7 cables S. by W. ¾ W. from False Egg island, lies John reef, which dries 3 feet at low water, with 9 to 20 fathoms close around; forming the north-western danger, on the south side of Beaver passage.

Leading mark.—The east extreme of Search islands just open south of the west end of Surf islet (east side of Smith sound) bearing E. ¼ S., will lead 3 cables to the northward of John reef, and into Smith sound through Beaver passage.

FALSE EGG ISLAND, resembling Egg island in shape, but smaller, is 150 feet high; it lies on the north side of Beaver passage, and is the outlying landmark for this northern entrance to Smith sound.

James rock.—At about 3 cables W. ¼ N. from False Egg island lies James rock, the exact position of which is somewhat doubtful; the sea breaks on this rock at low water, and between it and False Egg island the bottom is foul.

Clearing mark.—The west part of the large Canoe rock bearing North, or in line with Quoin hill (on Penrose island) passes three-quarters of a mile westward of James and John rocks, and leads clear (westward) of all dangers at the entrance of Smith sound.

Table island, the largest of the group of islands occupying the entrance to Smith sound, is about one mile long north and south, and half a mile broad, with the tops of the trees 120 feet above the sea, nearly flat. Table island when seen from abreast cape Caution appears to have two summits.

A cluster of rocks, several of which are covered at low water, extend half a mile from the west side of Table island, having 24 fathoms close to the outer rock.

Ann island, about half a mile in extent, is separated from the north end of Table island by a channel (one cable wide in some parts) in which shelter will be found for boats.

CLUSTER REEFS, consisting of several rocky heads and shoal patches, extend from Table island in a northerly and north-westerly direction into the entrance of Smith sound.

George rock, on which the sea breaks at low water, is the north-westernmost of the reefs, and lies one mile N. by W. ¾ W. from Ann island.

Edward reef dries 7 feet, and lies E.N.E. nearly three-quarters of a mile from George rock.

Wood rocks, which are awash at low water, situated nearly a quarter of mile E. by N. from Edward reef, consist of three rocky heads, and are the north-easternmost of Cluster reefs.

Bertie rock, with 3½ fathoms water on it, lies near the eastern edge of Cluster reefs; from the centre of this rock the north-west extreme of Ann island bears S.W. ¾ S. distant nearly three-quarters of a mile.

Leading marks.—The west extreme of False Egg island in line with Kelp head, bearing N. ¾ W., leads to the westward; and Limit point midway between Long and Shower islands, bearing E. by N. ¾ N., leads to the northward of Cluster reefs.

LONG POINT, the north-west point of Smith sound, lies E. by N. three-quarters of a mile from False Egg island; Tie island, which is nearly a quarter of a mile in extent, lies close westward of Long point, and is separated from it by a boat passage, in which there is a depth of 4 fathoms. Ada rock, which is awash at low water, lies 2 cables S.S.E. ½ E. from Tie island.

Brown island, on the north-east side of Beaver passage, lies half a mile S.E. ½ S. from Long point; the island is 250 feet high, nearly half a mile long N.N.W. and S.S.E., and a quarter of a mile broad, with 17 to 23 fathoms close to its south point. Between the south part of Brown island and Wood rocks, the eastern part of Beaver passage is 8 cables across with depths of 30 and 40 fathoms.

Surprise patch, on the north side of Smith sound, lies 1¾ miles N.E. by E. ¼ E. from the south extreme of Brown island; there is a depth of 5 fathoms on this patch, 7 to 17 fathoms close around, and no bottom at 40 fathoms 2 cables to the northward.

Judd rock, with less than 6 feet water on it, lies three-quarters of a mile N.E. by E. ½ E. from Surprise patch, and three-quarters of a mile W. by N. from Long island, the largest of the Barrier islands; there is no bottom at 40 fathoms in the vicinity of this rock.

Barrier islands, at the head of Smith sound, consists of two large and several small islands covering a space of about 5 miles in extent N.E. and S.W. Blakeney passage on the north, and Browning passage on the south side of these islands leading to Smith inlet, are each about one mile wide, with no bottom at a depth of 40 fathoms.

TAKUSH HARBOUR,* on the south shore of Smith sound, 6 miles within the entrance, and 1¼ miles east of Barrier islands, is 2 miles long, north-east and south-west, and one mile broad; and is the only anchorage to which a ship can resort for shelter when crossing Queen Charlotte sound. Vessels of large size can lie secure here.

The entrance is three-quarters of a mile wide, with no bottom at 39 fathoms, decreasing to 22 fathoms, rocky bottom, in the centre of Ship passage, which is 2½ cables wide, and is formed by Gnarled islands on the west, and Fish rocks (dry 3 feet at low water) on the east side. There is an Indian village here of the Quascilla tribe, but the lodges are wretchedly constructed and the people miserably poor.

Petrel shoal, on which there is a depth of only 15 feet, situated one cable S.S.E. ¾ E. from the easternmost Gnarled island, is the principal danger in rounding into Anchor bight.

Fly basin, at the head of Takush harbour, perfectly land-locked, is about one mile long E.N.E. and W.S.W., and one to 2 cables broad, with 2½ to 3 fathoms in the western and 6 to 8 fathoms in the eastern part of the basin. The entrance to Fly basin, which is about one cable wide, is contracted to a quarter of a cable by a shoal extending from the east entrance point, with a rock (dry 2 feet at low water), and a patch of 9 feet on its western edge; between this shoal and the west entrance point there is a depth of 9 fathoms. If required a small vessel could be taken into Fly basin.

Anchorage in Takush harbour will be found in 10 or 11 fathoms mud, in Anchor bight, midway between Ship rock and Steep point, with the north extreme of Bull point in line with Anchor islands, bearing N.E. by E. ½ E., and east extreme of Bloxham point N. by E. ½ E.

Tides.—It is high water, full and change, in Takush harbour at 1h. 0m.; springs rise 14 feet, neaps 11 feet.

Directions.—When bound to Takush harbour, it is recommended to pass through Browning passage, and, after passing North point, keep the north extreme of Bright island a little open north of that point bearing W. by S. ¼ S., until Berry point (south side of Fly basin) appears midway between the entrance points of Fly basin, S.E., which will lead through Ship passage; and when Steep point is well open of the southern-

* *See* Admiralty plan:—Takush harbour, on sheet Approaches to Fitzhugh and Smith sounds, No. 2,448; scale, $m = 1{\cdot}0$ inch.

most Gnarled island bearing W.S.W. a course may be steered for the anchorage in Anchor bight, taking care to avoid the shoal ground south of Gnarled island, passing midway between Anchor and Gnarled islands. Good steerage is required here, speed should be proportionately slow, the leads kept quickly going, and the water not shoaled to less than 7 fathoms.

SMITH INLET (Quas cillah), the continuation of Smith sound, is about 3 miles wide at its entrance, between eastern part of Takush harbour and Dsoolish bay; it is said to extend nearly 25 miles in an E.N.E. direction, and at about 9 miles from its entrance contracts to a general width of half a mile, the shores being formed of high, rocky precipices covered with wood. The inlet has not been surveyed.

A good sized stream flows into Smith inlet up which the salmon run in large numbers, and several canneries have been established in the neighbourhood.

FITZHUGH SOUND, the entrance to which lies 5 miles northward of Smith sound, is 39 miles long in a general N.N.W. and S.S.E. direction, having an average breadth of 3 miles, with no known hidden dangers throughout. The shores are mostly bold and rocky, the slopes are wooded and steep, and the elevation of the peaks from 1,000 to 3,400 feet. The flood tide runs to the northward. The southern entrance to Fitzhugh sound lies between Cranstown point, (the south-east entrance point of Fitzhugh sound and south entrance point of Rivers inlet), and cape Calvert the southern extremity of Calvert island which bears from Cranstown point W. ½ N. 5 miles.

The coast from Long point extends N.W. by N. 2¼ miles to Kelp head, from which Cranstown point bears N. by W. distant one mile.

The sound at 4 miles north of Safety cove is contracted to 1½ miles in width by Addenbrooke and adjacent islands, which lie on the east side; the shores on both sides are, however, steep-to, and the depths in the channel from 80 to 140 fathoms.

Canoe, Spur, and Paddle rocks lie about one mile off Kelp head, and occupy a space of 1½ miles in a N.N.W. and S.S.E. direction; the space thus enclosed being foul, and more or less covered with growing kelp. Canoe rock, the centre and most prominent of these rocks, is bare, 25 feet high, and stands boldly out from the coast, making a good point for identification.

Open bay, on the north-east side of Cranstown point, affords anchorage in 7 fathoms, about 2 cables from the shore during summer or with off-shore winds, but there is generally a swell in the bay, and it is only used by local craft as a temporary anchorage.

Cape Calvert, the south extreme of Calvert island, is the southern termination of Cape range (2,000 feet high); it presents a broad face of

rocky shore extending in a north-east and south-west direction about 350 feet high, and covered with a thick growth of hemlock and pine trees. At 2 miles north of the cape is Entry cone (1,200 feet high), which is conspicuous, and forms a good mark for recognizing Fitzhugh sound from the southward and westward; cape Calvert is fronted by the Sorrow islands, which are steep-to, of granite formation, and covered with gnarled and stunted trees; between these islands and the cape fair shelter may be found for boats in Grief bay (Telakwas), but during south-east or south-west gales, a swell is more or less experienced, rendering landing difficult and sometimes dangerous. Indians resort to Grief bay when travelling, or engaged in hunting the sea otter.

Cape Calvert is situated in latitude 51° 25′ 0″ N., longitude 127° 55′ 0″ W.

Directions for Fitzhugh sound from the southward.—After passing cape James (Shadwell passage), a N.N.W. ¾ W. course should be steered (or for Entry cone) until past the Storm islands; when, Addenbrooke island open of, and the east shore of Fitzhugh sound (beyond) shut in by, cape Calvert bearing N.N.W. ¼ W., will lead midway between Channel reef and Egg island, and up to the entrance of Fitzhugh sound. Allowance should be made for tidal streams: the flood sets to the eastward into Queen Charlotte and Smith sounds with a velocity at springs of nearly 2 knots.

From the westward.—Vessels from the westward, bound for Fitzhugh sound, should use North passage, between Sea Otter group and Calvert island; this passage is about 3 miles wide, with depths of 39 to 71 fathoms; Hedley patch with 9 fathoms water (possibly less) lies in the west entrance to North passage, at 3½ miles N. ¼ W. from Watch rock. (*See* page 455.)

SCHOONER RETREAT* **(Ka pi lish),** on the east side of Fitzhugh sound, is the name given to the anchorages among a cluster of islands at the south-west end of Penrose island, which here separates Fitzhugh sound from Rivers inlet. The Retreat affords a secure stopping place, and with care may be safely entered by steam vessels. Karslake point, (Joachim island) its south-eastern entrance point, lies 7 miles N.E. ½ N. from Sorrow island. The entrance to Schooner Retreat trends in a N.N.E. direction from Karlake point, where it is about half a mile wide, contracting to one cable between Sea bluff and Grey islets; inside the narrows to the eastward, it expands into Frigate bay.

Penrose island, which forms the northern protection to Schooner Retreat, lies in the mouth of Rivers inlet, a branch of the inlet passing on

* *See* Admiralty plan:—Schooner Retreat on sheet of plans of anchorages between cape Caution and Ogden channel, No. 1,901; scale, *m* = 6·0 inches.

either side of it. Quoin hill, 880 feet high, is situated near its south end about three-quarters of a mile inland.

Joachim island, the south-easternmost and largest of the cluster of islands at the south-west end of Penrose island, is 400 feet high, 1¼ miles long north and south, with an average breadth of half a mile; the north extreme of this island is separated from Penrose island by a boat passage.

Ironside island, the eastern part of which is 200 feet high, is the next in size, and is separated from Sea bluff, the north-west point of Joachim island, by the channel into Schooner retreat. Grey islets on the west side of the channel into Schooner Retreat, lie close off the south-east extreme of Ironside island.

Safe entrance, between Joachim and Ironside islands, three-quarters of a mile wide, has in the middle from 8 to 17 fathoms water. On the west side of Safe entrance, about 50 yards from Grey islets, lies a rock awash; from it shoal ground extends 1½ cables in a northerly direction, with 2 to 3 fathoms on it, and 4 to 10 fathoms close-to.

Comber rock, on which the sea often breaks, is an outlying danger at the north side of Safe entrance; the rock covers at three-quarters flood, and lies three-quarters of a cable S. by W. from Surf point, the south-west extreme of Ironside island.

Frigate bay, the southernmost anchorage in Schooner retreat, is about half a mile long north-east and south-west, and one-quarter of a mile broad, with depths of 9 to 20 fathoms; it is formed by the junction of Joachim and Penrose islands on the south, east, and north, and is protected on the west by Ironside and Maze islands. Centre islet, in the north part of the bay, of small extent, lies one mile N. by E. ½ E. from Karslake point, and 2¼ cables from the north end of Safe entrance; a shoal with from 2 to 3 fathoms on it, extends for more than one cable from its east end in a north-easterly direction towards Penrose island. There are several other islets and rocks in the eastern part of the bay, from which a boat passage leads into Rivers inlet.

The best anchorage in Frigate bay will be found just within Safe entrance, off a clean sandy beach, in 13 fathoms water, with the north-east extreme of Ironside island bearing W. ½ S., and the north-west extreme of Sea bluff S. ¼ W. Vessels should moor.

Maze islands are a cluster of small islands on an extensive shoal projecting in a northerly direction from the north-east end of Ironside island; the north-east prong of this shoal extends nearly across to Penrose island, leaving a narrow channel with 5½ to 9 fathoms water, which leads from Frigate bay to Secure anchorage.

Secure anchorage, north-west of Frigate bay, is about one-quarter of a mile long north-east and south-west, and 1½ cables broad, with depths of 9 to 11 fathoms; it is protected from seaward by Ironside, Bird, and Highway islands. Verney passage, leading to Secure anchorage from the westward, between Ironside and Bird islands, is nearly half a cable wide with 7 fathoms water in mid-channel, but it is contracted to about 30 yards by the shoals on either side, and is only suitable for small coasting vessels. Chance rock, at the entrance between Foily and Stunted islands, renders this passage dangerous.

Gales.—During S.E. and S.W. gales the gusts are furious, but with good ground tackle and care there is no danger in Schooner Retreat.

Tides.—It is high water, full and change, in Schooner Retreat at 0h. 30m.; springs rise 14 feet, neaps 11 feet.

Directions.—Vessels bound to Schooner Retreat should at all times use Safe entrance; from the southward, Quoin hill (880 feet high) at the south part of Penrose island, should be brought in line with the hill 200 feet high, on the east end of Ironside island bearing N.N.E., this will lead to abreast Karslake point, the west extreme of Joachim island, when Safe entrance will be open. After passing Karslake point steer very carefully and proceed at a moderate speed towards Bluff point until Quoin hill is in line with Centre island bearing N. ⅛ E., which will lead through Safe entrance in mid-channel, and to the anchorage in Frigate bay.

The depths between Karslake point and Safe entrance are irregular, varying from 24 and 30 fathoms abreast the point, to 40 fathoms no bottom within 2 cables of the entrance, thence decreasing gradually to 15 and 20 fathoms midway between Sea bluff and the southern Grey islet.

RIVERS INLET, the shores of which have not been surveyed, has an entrance on either side of Penrose island, but it is not known whether they are clear of danger. The inlet takes a northerly direction for about 8 miles, and then suddenly turns to the eastward and again to the northward for nearly 4 miles, terminating in 3 arms, each about 5 miles long. The inlet was explored by Vancouver, who named it Rivers Canal, and he says, "the land continued of a more moderate height further "up than had been generally found to be the case, but where it branched "off the shores were composed of high, steep, rocky mountains, and "affords no bottom in the middle at 80 fathoms."*

At the head of Rivers inlet is a settlement of Bella Bella Indians numbering about 150, and a canning establishment named Owikino.

* *See* Vancouver's Voyages, Vol. ii., p. 378.

Addenbrooke island.—At about 8 miles N.W. from Karslake point lie a group of islands off the eastern shore of the sound abreast an unexplored opening. Addenbrooke, the most western of these islands, extends westward into the sound narrowing the width of the passage between it and Calvert island to about 1¾ miles.

SAFETY COVE* (Oat so alis), on the west shore of Fitzhugh sound, 7 miles to the northward of cape Calvert, is about one mile long W.S.W. and E.N.E., and nearly half a mile wide at its entrance, to the westward of which the shores of the cove extend parallel to each other at a distance of 2 cables apart; there are depths of 9 to 17 fathoms within half a cable of its shores, and 14 to 19 fathoms, soft mud, in the middle of the cove; a bank of sand and mud which dries, extends 3 cables from the head with 7 fathoms close to its edge. The shores, except near the head are high, rocky, and steep-to, rising to an elevation of about 1,000 feet. There is a conical peak at the head of the cove which bears W. ¼ S. from the middle of the entrance. The north entrance point of Safety cove has two small islets lying off it, which are useful in identifying the entrance, especially when coming from the northward.

Anchorage.—Good anchorage will be obtained in 13 fathoms, mud bottom, in the middle of Safety cove abreast a waterfall on the north shore. Entering at night, a vessel should keep in the middle of the cove, and keeping the lead going anchor as soon as 17 fathoms are struck. During south-east or south-west gales, strong gusts blow across the valley at the head of this cove.

Fresh water.—The stream which flows into the head of Safety cove affords excellent water, but is difficult to obtain by boats. The waterfall on the north shore, unless in exceptionally dry weather (August and September), will afford a good supply.

Tides.—It is high water, full and change, in Safety cove, at 1h. 0m.; springs rise 14 feet, neaps 11 feet.

Kwakshua passage, between Calvert and Hecate islands, 7½ miles north of Safety cove, leads to the sea; this passage is only partially examined; it has, however, been used by coasting vessels. (*See* page 456.)

Hakai channel, 5½ miles north of Kwakshua, between Hecate island and the smaller islands lying off the south side of Hunter island, is an unexplored channel leading to sea. Vancouver reached the sea by this passage in 1792. (*See* page 456.)

* *See* Admiralty plan:—Safety cove, on sheet of plans of anchorages between cape Caution and Ogden channel, No. 1,901; scale, *m* = 4·0 inches.

GOLDSTREAM HARBOUR,* at the south-east entrance point of Hakai channel, affords good accommodation for small vessels; it is about 2 cables long north and south, and 2 cables broad, with depths of 7 to 15 fathoms, sand and mud. The entrance to this harbour from Fitzhugh sound is through an intricate passage little over half a cable wide, between the north extreme of Hecate island which forms the south shore, and an island about one mile in extent which forms the north side of Goldstream harbour. Foul ground marked by kelp, extends one cable from Kelp point, the north entrance point of the harbour. Evening rock, which dries 3 feet at low water springs, lies near the middle of the passage about 2 cables within the entrance on the north side of the channel; it would, therefore, be advisable, in the absence of good local knowledge, to place a boat near this rock (when covered) before entering or leaving the harbour, and proceeding at slow speed, keep in mid-channel, where there is a general depth of 6 fathoms.

Tides.—It is high water, full and change, in Goldstream harbour at 1h. 0m.; springs rise 15 feet, neaps 12 feet.

Nalau island, separating Nalau and Hakai passages is 4½ miles long north and south, 3 miles wide, and 650 feet high; it is situated between Hunter and Hecate islands.

Nalau passage, 4 miles north-westward of Hakai, is an unexplored channel leading to sea. (*See* page 458.)

NAMU HARBOUR,† at the south entrance of Burke channel and one mile south of Edmund point, on the east side of Fitzhugh sound, lies N.E. by N. 6 miles from Nalau passage, and 15½ miles N.W. by N. from Addenbrooke island; the intervening east shore of Fitzhugh sound being abrupt and bold. This harbour is included between Cliff and Kiwash islands to the west, and Plover island and the mainland in other directions. It is three-quarters of a mile long, E.N.E. and W.S.W., and three-quarters of a mile broad, with depths of 20 to 28 fathoms; at its entrance lies Kiwash, a round island, 200 feet high, a quarter of a mile in diameter, and covered with trees. South passage, between Kiwash and Plover islands (150 feet high), the latter forming the south entrance point of Namu harbour, is nearly half a mile wide, with 23 to 28 fathoms water; North passage, between Kiwash and Cliff islands, on the northern side of the harbour, is 3 cables wide with 35 to 18 fathoms water. Namu harbour may be entered either by North or South passage.

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* *See* Admiralty plan :—Goldstream harbour on sheet of plans of anchorages between cape Caution and Ogden channel, No. 1,901; scale, $m = 6{\cdot}0$ inches.

† *See* Admiralty plan :—Namu harbour on sheet of plans of anchorages between cape Caution and Ogden channel, No. 1,901; scale, $m = 4{\cdot}0$ inches.

From the north side of Namu harbour two inlets indent the land for the distance of about one mile; the more western is named Harlequin basin, the other, which is choked with rocks, is called Rock creek. At the mouth of the latter is Whirlwind bay, its entrance being marked by two small islands, Sunday island to the northward and Clam island to the southward one quarter of a mile apart. Two or 3 miles to the eastward of the harbour a chain of mountains from 2,600 to 3,300 feet high extends in a N.N.E. and S.S.W. direction for 6 miles.

Anchorage.—Large vessels should anchor in 20 fathoms, in the centre of Namu harbour, with the north extreme of Kiwash island bearing West, and the west extreme of Plover island S. by E. Small vessels may anchor in Whirlwind bay on the east side of Namu harbour in 12 fathoms, clay, with the north extreme of Kiwash island bearing W. by S., and the centre of Clam island (a small island south of the bay) South. During the autumn and winter months the anchorage in Whirlwind bay is not recommended, as furious gusts blow over the mountains (3,000 feet high) in its vicinity. This anchorage is moreover confined by Loo rock, on which there is only 3 feet water, lying nearly in the middle of the bay, E. by N. ¼ N. 2 cables from the south extreme of Sunday island. It is recommended not to bring Sunday island to bear to the westward of W.N.W. when entering Whirlwind bay.

There is a large stream and an old Indian camp in Whirlwind bay.

Tides.—It is high water, full and change, in Namu harbour at 1h. 0m.; springs rise 15 feet, neaps 12½ feet.

BURKE CHANNEL, an inlet on the east side of Fitzhugh sound, 3 miles northward of Namu harbour, leads to Belakula anchorage at the head of North Bentinck arm, a distance of 55 miles in a general north-easterly direction, from its junction with Fitzhugh sound. Burke channel lies between high, precipitous, rocky mountains, the sides of which are covered with stunted pine trees, and mostly snow-capped, becoming more lofty as the head of the inlet is approached. Burke channel and Bentinck arm, though not surveyed in detail, have been frequently traversed both by day and night and may be safely navigated.*

Edmund point, the south entrance point of Burke channel, is low and wooded, and has several small islands south of it, lying off an indentation, which has the appearance of affording sheltered anchorage. Some small islets also lie in the channel, eastward of Edmund point.

Walker point, the north entrance point to the channel, is formed by an island situated 2 miles north-west from Edmund point; this island is

* The description of Burke channel is from the Remark book of Mr. W. H. Sharp, Master R.N., H.M.S. *Sutlej*, 1865.

steep-to, but at a distance of 2 cables the water is not deeper than 26 fathoms, mud bottom, deepening quickly a short distance further; a position which might be used in a fog for anchoring.

Temporary anchorage, north of Walker point, might on emergency, with care, and sending a boat ahead, be taken up, but there are many covering reefs.

The first reach of Burke channel takes a N.N.E. ½ E. direction for 5 miles, and thence N.E. ¾ E. for 3½ miles, the first part being a little over one mile wide, but the latter part only three-quarters of a mile across. The tides are strong in this reach, and several heavy tide rips are met with; but for the remainder of the distance to Belakula the tidal streams are not much felt. Immediately facing the eastern end of this reach is a bay which might possibly afford anchorage. The sea water here is brackish.

Restoration cove, at 4 miles from the N.E. point of the first reach is situated immediately under a high, conical mountain, and has a sandy beach at its head, off which, at half a mile, is a depth of 40 fathoms shoaling gradually to 3 fathoms close to the shore. Several small streams enter the cove.

Anchorage may be taken up in 18 fathoms at about 1½ cables from low water mark: the shore should be approached very slowly when coming to an anchor, as the bank is extremely steep-to and the water shoals very suddenly.

The second reach of Burke channel trends N. by W. for 10½ miles, ending abreast a low, wooded point at the foot of a high mountain; thence the channel takes a N.N.E. ¾ E. direction for 12 miles, another arm (Kwatna) branching off to the south-east. At one cable from the south-west point of entrance to this arm is a rock, which uncovers at low water: it is the only known danger in Burke channel, and may be avoided by keeping the north shore aboard.

Hence the channel takes a N.E. ¼ N. direction for 4 miles along the base of a remarkably bare, stony mountain situated on the south shore, which is almost entirely devoid of vegetation. Thence the channel trends N.N.E. for 6 miles, at which distance Deane channel (or canal) branches off to the north-west, Burke channel continuing for 7 miles N.E. by E. ½ E., to Menzies point, in lat. 52° 18′ 30″ N., where it divides into the north and south Bentinck arms, the former taking a N.E., the latter a S.E. direction.

North Bentinck arm is 8 miles long, and just within the entrance, on the north shore, is a small bay affording anchorage for small craft. The head terminates in a sand and mud flat fronting low, swampy ground, covered with grass, which is submerged at high water. The inlet is here $1\frac{3}{10}$ miles wide.

Belakula,* at the head of North Bentinck arm, affords indifferent anchorage to vessels close to the mud flat at the mouth of the river, on the south side east of Sutlej point. In taking up a berth, great care is required; the deep sea lead should be used, and a leadsman on the dolphin striker will guard against getting too near the edge of the flat, which is quite steep-to. A large vessel should moor in 45 to 50 fathoms, as the bank is very steep-to, deepening from one to 18 fathoms in a distance of 200 feet; a stern anchor may also be required, or a hawser laid out to the shore will be useful for keeping the hawse clear. Small vessels may find shelter during summer, on the north shore under Custom house point. The country abounds in fur-bearing animals.

Belakula or Nookhalk river is a stream of considerable size and velocity, the deposit from which has formed the steep bank at the head of the inlet. The water at Belakula is quite fresh alongside, and if pumped in at low water is fit for drinking. There are also several good places for watering at, on the north shore, opposite the anchorage, a boat being able to go right underneath the waterfalls.

Tides.—It is high water, at full and change, at 12 hrs.; springs rise 13 feet.

Winds.—The prevailing wind in Bentinck arm in summer is from south-west; the westerly winds of the ocean blowing across Fitzhugh sound being led up the inlet as through a funnel following the direction of the different bends. The breeze generally sets in about 10 o'clock in the forenoon, and blows fresh until sunset when it usually falls calm.

South Bentinck arm.—From Menzies point, the South Bentinck arm branches off the south-eastward, about a mile in breadth, with high land on both sides, for about 20 miles. At 9 miles from Menzies point an island lies on the eastern shore. The head of the arm is reported to be shallow, 5 and 12 fathoms, but it has not been surveyed, and is seldom visited.

Kiltik.—From Nalau passage the coast of Hunter island extends 12 miles in a N. by W. ¼ W. direction with only two openings, the northernmost of these named Kiltik on the west side of Fitzhugh sound, opposite Edmund point, is a narrow creek (less than 2 cables), extending nearly a mile in a westerly direction, with an average depth of 20 fathoms in the centre, but shoal for one-third of a mile from its head. This creek, it is supposed, might be used by moderate sized vessels, but has not been examined in detail.

The Trap, 13 miles from the south-eastern point of Hunter island a small islet lies off an indentation of the coast forming what has been termed

* *See* Admiralty plan:—Belakula anchorage on sheet of plans No. 1,462; scale, $m = 4{\cdot}0$ inches.

the Trap. Strangers might be tempted to enter this opening; it is, however extremely contracted not affording room for a steamer to turn, and dangers are supposed to exist in the passage round the island, it should therefore b ıvoided.

FISHER CHANNEL, the continuation of Fitzhugh sound northward from the entrance to Burke channel, leads to Lama and Gunboat passages on the west, and to port John and Evans arm on the east. It is a clear navigable channel, possessing, with the exception of the Fog rocks, no known danger: at 15 miles from Walker point Fisher channel divides into two, Johnson channel taking a N.N.W. and Cousins inlet a North direction; the former at a distance of 9 miles splitting into several arms (Roscoe and Sisters inlets on either side of Florence peninsula and Bullock and Ellerslie channels on either side of Yeo island). Bullock and Ellerslie channels communicate with Seaforth channel (*see* page 371), and from the north point of Yeo island, at their northern junction, the main inlet continues northward for a further distance of 10 miles to about lat. 52° 37′ N. These channels northward of Gunboat passage have not been surveyed in detail, and should therefore be navigated with caution.

"Fisher canal on the western side is of moderate height; its surface, composed principally of rocks, is uneven and full of chasms, where a soil formed by the decay of vegetation produces pine trees of slender growth, maple, birch, small fruited crab and shrubs. The eastern shore rises more abruptly inland to lofty rugged mountains covered with snow." (*See* Vancouver's Voyages.)

Fog rocks, situated rather on the east side of Fitzhugh sound and 3 miles north of Walker point, consist of six rocks above water, flat and of a whitish colour, the highest of which is 25 feet high, with a few shrubs on it; close to the southernmost rock several small black rocks uncover at low water. These rocks (which appear nearly in mid-channel from the southward) may be passed on either side, but the main route lies to the westward of them, passing them at about half a mile. There is a depth of 103 fathoms, mud, between Fog rocks and the eastern shore of Fitzhugh sound.

PORT JOHN.*—At 4 miles north of Lama passage, on the eastern shore of Fisher channel, and 9 miles northward of Fog rocks, is an indentation, in the northern part of which, immediately under Remarkable cone mountain, 2,302 feet high, is port John, southward of which is Evans arm, into which there are two passages on either side of Matthew island, 360 feet high, which lies at the entrance to the arm. The south passage is

* *See* Admiralty chart:—Lama passage and Seaforth channel, No. 2,449; scale, m = 1·55 inches.

half a mile wide, and clear of danger. The north passage is only one-third of a mile wide, and this near the east end is contracted to 1½ cables by a rock lying in the centre.

Port John (of Vancouver) affords anchorage in 20 fathoms, but is much confined by Mark rock nearly in the middle, covering at half flood, and by a flat extending off the stream at its head. There is also anchorage at the head of Evans arm in 20 fathoms, which may be reached through South passage, but the immediate approach to it north of Boot island is foul, and a vessel of size should be preceded by a boat. North passage should only be used after temporarily buoying Peril rock, which has only 12 feet water on it, and lies nearly in the middle of the east entrance to the passage.

Tides.—It is high water, full and change, in port John, at 1h. 0m.; springs rise 13 feet.

DEAN CANAL leads out of Cousins inlet to the N.N.E., in which direction it extends for about 12 miles, and there divides into three branches; one (Cascade inlet) taking a north-west direction; another (Labouchere channel) to the south-east, and communicating with Burke channel (*see* page 364); the other, main inlet, extending in a north and north-east direction, "with an average width of one mile for a distance of 18 miles, when it turns to the N.N.W. for 9 miles, terminating in low marshy land in about lat. 52° 52′ N., into which the Kimswit river discharges itself. Anchorage is reported on a spit, off a small stream on the west shore, near the head.

Cascade inlet, so named by Vancouver, from the number of waterfalls, extends in a north-west direction for about 11 miles with an average width of three-quarters of a mile. It, in common with the other branches of Dean channel, has not been surveyed in detail; its shores are composed of perpendicular precipices, and several large cascades come down from the high mountains that overlook it. "These were extremely grand, and by much the largest and most tremendous of any we had ever beheld. The impetuosity with which these waters descended produced a strong current of air that reached nearly to the opposite side of the canal, though it was perfectly calm in every other direction."*

LAMA PASSAGE,† between Hunter and Denny islands, is the main passage connecting Fisher channel (the northern continuation of Fitzhugh sound) with Seaforth channel and Milbank sound; its eastern entrance on the west side of Fisher channel, 6 miles north of Fog

* Vancouver's Voyages, Vol. ii., p. 268.

† *See* Admiralty chart:—Lama passage and Seaforth channel, No. 2,449; scale, m = 1·55 inches.

rocks, may be recognised by a conical mountain 1,000 feet high, on the north-east point of Hunter island, and by Pointer island, on the south side of this entrance, where it is nearly one mile wide. Thence the passage trends West 2 miles to abreast Serpent point on the south shore, the breadth being about half a mile, and the depths 130 fathoms in the middle, 25 and 26 fathoms near the shores; it then widens and trends W.S.W. 4 miles to abreast Twilight point (the south-west point of Denny island) with no bottom at 38 fathoms near the north shore, and 23, 12, and 20 fathoms close to the points extending from the south shore.

The entrance to Plumper channel (*see* page 459), which is one mile wide, lies opposite Twilight point, from which Lama passage turns to the north-west between Denny and Campbell islands, for 4 miles to Grave point, which has several Indian graves on it; from 2½ miles north of Twilight point to Grave point the passage is contracted to 2 cables, with uniform depths of 25 to 30 fathoms.

The north shore of Lama passage is bold and but slightly indented, but the southern, after the first 3 miles, is penetrated by a number of indentations, some of which afford shelter.

Tides.—About midway between Fog rocks and Lama passage the flood tide from the northward meets that from the southward.

COOPER INLET, situated on the southern shore of Lama passage, 5 miles from the eastern entrance, is deep, and contains several small creeks, the indentations already mentioned, off which lie a number of islets and rocks. In fine weather anchorage may be obtained in 14 fathoms water under Westminster point, the north-west point of the inlet, by bringing it to bear W.N.W., and Harbour-master point the north-east point of the inlet, just open of the reefs off Charles point bearing N.E. by E. ¾ E.

Jane creek, in the south-east corner of Cooper inlet, may be used by small vessels. Charles point, its north point, has two reefs extending one cable from it in a north-westerly direction, the outer of which dries 9 feet.

Anchorage.—Good anchorage may be had in this creek in 9 fathoms water, with Charles point in line with the east point of Canoe bight (on the opposite shore of the passage) bearing N.W. ¼ W., and George point, the south entrance point of Jane creek, bearing S.W. by W. Large vessels may anchor in about 18 fathoms midway between Charles and George points; the bottom in this creek is mostly rocky.

Camp island, lying close to the south-west extremity of Denny island, and the turning point into the northern part of Lama passage, should not be rounded nearer than half a mile, as the bottom is foul for

a distance of 3 cables in a south-easterly direction from it, with patches that uncover 2 feet at low water springs.

McLAUGHLIN BAY,* on the west shore of Lama passage, half a mile south of Grave point, is a good stopping place; it is about 4 cables wide and 1½ cables deep, with 8 to 14 fathoms water. The south point of the bay has a bare summit 150 feet high, which in thick weather is a useful guide to a stranger. The anchorage is in 11 fathoms off the centre of the beach about one cable from the shore, with Grave point open east of south-west point of Narrows island bearing N. ¼ W., and Archibald point open east of Napier point bearing S.E. by E. A spit runs off with Bare hill bearing West. Anchorage should be taken up well to the southward of the church.

In this bay is the site of an old Hudson bay trading post; there is a small quantity of cleared ground at the foot of a rocky hill 200 feet high, a quarter of a mile from the beach, on the west side of which there is a lake. This is the only Indian winter residence between Queen Charlotte sound and Seaforth channel.

The Bella Bella natives migrated here from Bella Bella islands in 1868; an American missionary now resides in the bay, and a small church and school-house have been recently erected.

A rock is said, from Indian report, to exist in Lama passage abreast McLaughlin bay, and to lie half a cable from the eastern shore, with Napier point bearing S.S.E. distant nearly 6 cables; this reported danger may be avoided by keeping in mid-channel—H.M.S. *Amethyst*, 1876. This rock was searched for without success by H.M.S. *Rocket* in 1879. This passage was frequently used by the *Beaver* during the survey, and though not then found the rock may exist, and consequently the western shore should be favoured.

Tides.—It is high water at full and change in McLaughlin bay at 1h. 0m.; springs rise 14 feet, neaps 10 feet.

Bella Bella islands lie three-quarters of a mile north of Grave point, bare and about 15 feet high; these islands were formerly inhabited during the summer months by the Indians of the once powerful Bella Bella tribe. In 1884 there was an Indian population of 250. Temporary anchorage may be had to the eastward of Bella Bella islands off a green bushy flat, the old winter residence of these natives.

KLICK TSO ATLI HARBOUR, on the north side of Denny island, and 1½ miles east of Bella Bella islands, is about one mile in extent,

* *See* Admiralty plan :—McLaughlin bay, on sheet of plans of anchorages between cape Caution and Ogden channel, No. 1,901; scale $m = 5{\cdot}5$ inches.

with depths of 9 to 13 fathoms, and affords excellent shelter for vessels of any size. Harbour island, off the north-west point of Klick tso atli, has a reef extending one cable from its east end.

Steamer passage.—The channel south of Harbour island is one cable wide, with a depth of 7 fathoms, and is suitable for small vessels; large vessels are recommended to pass north of Harbour island and through Wheelock pass, which lies between a 3-fathom patch near the centre of the channel and Noble point, the north-east entrance point of the harbour, from which a 3-fathom shoal extends three-quarters of a cable in a south-westerly direction.

The west extreme of Cypress island in line with the east extreme of Meadow island bearing N.N.W. ¾ W. leads through Wheelock pass in 11 to 19 fathoms water, and when Harbour island bears West a vessel may anchor in 12 fathoms.

A large vessel not wishing to enter Klick tso atli harbour, may obtain secure anchorage in 15 fathoms, with Harbour island bearing S.S.E. ¼ E. distant 3 cables.

Ka koosh dish creek, just north of Noble point, and extending 1¾ miles in an easterly direction, is suitable for small craft, but is barred across by kelp, having 3½ fathoms.

There is an Indian fishing station at the head of this creek.

Main passage, leading from Lama passage to Seaforth channel, between the north-east extreme of Campbell and Narrows islands, is three-quarters of a mile long N.N.E. and S.S.W., and from 2 to 2¾ cables wide, with depths of 20 to 30 fathoms in it. Care should be taken to maintain a mid-channel course, and in thick weather much caution must be observed as the tides are very strong.

Narrows island, situated about three-quarters of a mile north of Bella Bella islands, is three-quarters of a mile long E.N.E. and W.S.W., and nearly half a mile broad; at one cable from the south side of Narrows island there is a ledge of rocks awash at high water, with 5 fathoms close to.

Pole and Tree islets, situated about a quarter of a mile from the east extreme of Narrows island, are two small islets 2 cables apart in a north and south direction from each other; Tree islet the northernmost is 120 feet high, with a detached rock close to its north-east side. There are two rocky ledges between these islets and Narrows island.

Hodges reef, which dries 2 feet at low water springs, with 6 and 7 fathoms close-to, lies nearly in mid-channel between Tree islet and Deer

island, the latter lying 4 cables east from the former. From this reef the centre of Tree islet bears West 2 cables, and the east extreme of Pole islet S.W. ¾ S. 3 cables.

Meadow island, half a mile long N.E. and S.W., lies 2 cables south-east of Pole islet. In the channel between them are depths of 5 to 15 fathoms, and a reef lies half a cable from the north point of Meadow island.

Deer and Cypress islands lie to the eastward of the above islands, and are joined at low water; the former is half a mile long in a N.W. and S.E. direction; the latter one mile long E.N.E. and W.S.W.

Gunboat passage, between Denny and Cunningham islands, is narrow and intricate, containing many rocks and kelp patches; in some places the channel is not more than half a cable wide. From its western entrance it trends about E. by N. for 6 miles, thence North 2 miles to its eastern entrance, which is at the junction of Fisher and Dean channels.

Gunboat passage should not be attempted unless in small handy steam coasting vessels and with good local knowledge.

SEAFORTH CHANNEL, the main channel connecting Lama passage with Milbank sound, between Campbell island, and the Bardswell group on the south, and Chatfield, Yeo, and Don islands on the north, is 14 miles long E. by N. and W. by S. with an average breadth of one mile; the land on both sides is much broken by islands with channels between leading north and south; the water is generally deep, and with the Admiralty charts there should be no difficulty in navigating, in ordinary weather.

On the north side three arms branch off to the northward; Deer passage, the eastern, between Cunningham and Chatfield islands, is about 7 miles long, and communicates with Johnson channel; Return channel, the middle one, between Chatfield and Yeo islands, is about 3 miles in length and joins Bullock channel; and Spiller channel, the western, between Yeo and Don islands, extends 4 miles and connects with Ellerslie channel (*see* page 366). These channels have not been more than casually examined, and their entrances are fronted by innumerable small islands, rocks, and reefs. On the south side of Seaforth channel at 9½ miles to the eastward of Sound point is the entrance to Hecate channel. This passage is about 10 miles long in a general southerly direction, with an average width of one mile, and leads into Queen's sound.

ORMIDALE HARBOUR, at the north extreme of Campbell island, is about one mile deep in a S.S.E. direction, and is protected from the north-east by Thorburne and Nevoy islands which lie across its entrance. The channel in, nearly one mile S.W. ¾ S. from Grassy islet, lies

westward of Nevoy island, it is about 1½ cables wide, with from 14 to 16 fathoms water, and is clear of danger if a mid-channel course is steered. Inside the water is deep, the depth over the greater part being from 15 to 20 fathoms. Anchorage may be had in 17 fathoms about 2 cables S.S.E. from Nevoy island.

The passage in is longer, but the berth is more convenient than in Kynumpt harbour directly west of it.

KYNUMPT HARBOUR,* on the north point of Campbell island, immediately west of Ormidale harbour (south shore of Seaforth channel), and about 2 miles westward from its junction with Lama passage, may be recognised by Grassy islet 20 feet high, and Regatta reefs, both of which are conspicuous, lying in the middle of the channel 1¼ miles eastward of the harbour, and also by White stone, a conspicuous bare rock 12 feet high, lying 2 cables west of the entrance.

The harbour, the entrance to which is between Shelf point and Low island, is 4 cables long N.N.W. and S.S.E., and averaging 2 cables in breadth with 6 to 16 fathoms, mud bottom; the best anchorage is in 7 to 9 fathoms with the north extreme of Berry point bearing E.N.E., and the west extreme of Low island N. by E. ½ E.† A shoal patch with 1¼ fathoms on it, lies on the west side of the harbour, 2¼ cables S.S.E. ½ E. from Shelf point, distant one cable from the shore.

Tides.—It is high water, full and change, in Kynumpt harbour at 0h. 30m.; springs rise 14 feet, neaps 11 feet.

Grassy islet, small, 20 feet high, covered with long grass and bushes, and with only two trees on it, lies nearly one mile N.E. by N. from the entrance to Ormidale harbour.

Regatta rock, awash at high water, one cable in extent north-east and south-west, lies half a mile W. by N. ½ N. from Grassy island.

Dall patch, a shoal with less than 6 feet water on it, lies half a mile N.N.E. from the entrance to Kynumpt harbour; from the centre of the patch Defeat point bears S. ½ W., distant 4 cables; White stone S.W. by W. ½ W., 6½ cables; and west extreme of Low island S. by W. ½ W.; a shoal of 3 fathoms extends 1¼ cables to the westward of Dall patch.

Caution.—To avoid Dall patch, it is recommended to keep the southern shore on board, which in this vicinity may be approached to within 1½ cables; or if wishing to go northward of the patch,—Grassy islet, in line

* *See* Admiralty plans:—Kynumpt harbour, on sheet No. 1901; scale, $m = 5{\cdot}5$ inches.

† A rock with 10 feet water over it has been reported to lie 2 cables S.W. from Low island, but though searched for in H.M.S. *Heroine* in November 1883, it was not found.

with the south extreme of Handyside island bearing E. ¾ N., leads nearly midway between Dall patch and Regatta rock.

Dundivan inlet, on the north shore of Dufferin island, about 3 miles westward of Kynumpt harbour, indents the coast about 1¾ miles in a south-east direction. It branches off into several creeks, of which Lockhart and Rait are the largest, and there are several small islets just within the entrance. The water is too deep to afford convenient anchorage. The south shore of Seaforth channel, westward of Dundivan inlet, trends in nearly a straight line to Sound point, the south point of entrance. At 2½ miles eastward of Sound point Gale creek branches off in a southerly direction, and is supposed to connect with Boddy creek from the south-east, thus separating Dufferin island from the remainder of the Bardswell group.

Edge reef, on which there is a depth of 4½ fathoms, lies nearly 4 cables distant from the south shore, at 2 miles eastward of Sound point. Several patches lie between it and the shore.

Cod bank, on which the least depth found was 27 fathoms, sand, lies in the middle of the western entrance to Seaforth channel 1½ miles N. by W. from Sound point; there are 58 fathoms on the south side, and 163 fathoms, rock, close-to on the north side of Cod bank

Anchorage.—Between Sound point, and Gale creek at 2½ miles to the eastward of it, a bank extends about three-quarters of a mile from the south shore of Seaforth channel; on its outer edge, which is steep-to, there are depths of 28 and 30 fathoms, decreasing to 18 and 10 fathoms close to the shore for a distance of one mile east of Sound point. During foggy weather, temporary anchorage may, with careful use of the lead, be obtained on this bank.

Hyndman reefs, the outer of several islets and reefs lying on the western shore at the entrance to Spiller channel, is nearly in the middle of that channel, and has a small rock only 3 feet above water on it south end.

Berry creek.—The south shore of Don island is broken and rocky, and has numerous islets and rocks skirting it. Berry creek is nearly 2 miles long in a northerly direction, and as the water in it is deep, and the entrance blocked by small islets, it is useless as an anchorage.

Blair inlet, 3 miles westward of Berry creek, is another indentation, useless as an anchorage on account of the numerous rocks with which it is studded. Ivory and Watch islands form its south side.

Midge reefs, on the north side of Seaforth channel, cover at 10 feet rise, and extend 4 cables in a southerly direction from Bush point (Don

island), and are 3¾ miles within the western entrance to the channel. The Mark rock lies one cable distant from the south-east point of Don island, and one mile E.N.E. from Midge reefs; between them is Sunk reef with 4 fathoms water on it. Bare rock, black and low, kept just open to the southward of Surf islet, bearing W. ¼ S., leads half a mile to the southward of Midge reefs, and the north shore of Seaforth channel should not be approached within this distance.

Mouse rock, on which the sea sometimes breaks, lies half a mile W.S.W. of Ivory island off the entrance to Blair inlet. Idol point kept open of Surf islet, bearing E. ¼ N. leads 2 cables south of Mouse rock.

CHAPTER X.

MILBANK SOUND TO CHATHAM SOUND.

VARIATION IN 1888.

Milbank sound, 26° 00′ E. | Chatham sound, 27° 10′ E.

MILBANK SOUND has its entrance between the parallels of 52° 9′ and 52° 16′ N. and the meridians of 128° 33′ and 128° 42′ W. This spacious sheet of water is the main opening from seaward leading to Seaforth, Finlayson, and Mathieson channels.*

At its entrance between cape Swain and Day point, the sound is nearly 9 miles wide, which breadth it maintains in a N.N.E. direction for 5 miles, thence it trends more northerly, and takes a N.N.W. direction for 10 miles, leading in that direction into Finlayson channel.

Landmarks.—Approaching Milbank sound from the south-westward, Helmet peak on Lake island, at the eastern shore of the sound, is conspicuous. This remarkable peak is 1,032 feet high, and bears a striking resemblance to a helmet, with the sloping side towards the west.

Stripe mountain, on the north side of Dowager island, at the entrance of Finlayson channel, is 2,020 feet high, pyramidal in shape, with a remarkable landslip down its south-west side, destitute of timber and soil, but otherwise wooded to its summit; at its base is a comparatively level space scantily covered with vegetation, which is remarkable in such a thickly timbered country.

Nearing the sound the low wooded shores of cape Swain, the south-west entrance point to the sound, will be recognised. The shore northward of it is much broken, and the tops of the trees are about 120 feet high.

Cape Swain is situated in latitude 52° 8′ 50″ N., longitude 128° 33′ 30″ W.

Day point (south point of Price island), the north-west entrance point of Milbank sound, has a group of wooded islets, rocks awash at high water, and sunken rocks extending 2 miles S.S.W. from it; the western

* *See* Admiralty charts:—Cape Caution to port Simpson, northern and southern portions, No. 1,923 a and b; scale, $m = 0{\cdot}25$ of an inch.

island of the group (Outer island) being round, wooded, and conspicuous. The outer edge of these dangers lies $2\frac{1}{10}$ miles S.S.W. from Day point, and 8 cables S.E. $\frac{1}{2}$ S. from Outer island.*

White rock (Ka mas ik), lying about 5 miles within the sound, is 50 feet high, and half a mile N. by E. from it, is a smaller rock (Bare rock) 6 feet above high water. Both rocks are conspicuous, as, lying well out in the sound, they show out against the dark background of pine and cedar, which line the shores of Milbank sound.

From White rock, a rocky ridge (on which the sea sometimes breaks) extends half a mile to the south-westward; and a patch of 2 fathoms lies $2\frac{1}{2}$ cables East of the same rock.

There are depths of 50 fathoms, rock, at one mile eastward, and 34 fathoms close westward of this rock.

The south extreme of Cliff island, seen just open of Boulder head, bearing N.N.W. $\frac{1}{2}$ W., leads 8 cables eastward of this rock.

Discovery rocks, situated off cape Swain, are two dangerous rocks lying 8 cables N. by E. and S. by W. from each other. The southern danger, over which the sea seldom breaks, lies one mile W. $\frac{1}{2}$ S. from cape Swain. The northern rock, which is usually indicated by breakers, lies N.W. $\frac{1}{4}$ W. distant $1\frac{1}{10}$ miles from cape Swain.

West rock, situated on the eastern shore of the sound, is of small extent, 8 feet above high water, and lies half a mile S.W. $\frac{1}{4}$ S. from Sound point.

Several patches which uncover at low water lie between Sound point and West rock.

Mouse rock (*see* p. 374) is a dangerous sunken rock on which the sea generally breaks, lying at the north-west entrance to Seaforth channel, 6 cables W. $\frac{1}{2}$ N. from Surf islet.

Bush point (north side of Seaforth channel) seen just open south of Surf islet, bearing E. by N. $\frac{1}{2}$ N. leads southward; and Helmet peak seen just open of the west extreme of Mary island, bearing N. $\frac{3}{4}$ E., leads westward of Mouse rock.

Vancouver rock, a dangerous rock which uncovers 12 feet at low water, and is steep-to on all sides (there being depths of 13 and 14 fathoms within one cable of the rock), lies 4 miles N.N.W. $\frac{1}{4}$ W. from White rock, and $1\frac{1}{2}$ miles N.W. by W. $\frac{1}{2}$ W. from Boulder head. When visible this rock presents the appearance of a large whale, and is conspicuous.

* Kelp will be seen on the surface of the water, growing on nearly every danger with a bottom of rock or stones, during the summer and autumn months; but during the winter and spring this useful marine plant is not always to be seen.

Cross point (south-east extreme of Lady island), in line with Boulder head, bearing E. ¾ S., leads 6 cables southward; and Low point seen just open westward of the North island group, bearing North, leads westward of Vancouver rock.

Cross ledge extends 8 cables to the southward of Cross point, and partially uncovers. There is a depth of 20 fathoms close southward of Cross ledge.

Surf islet, bearing E. by S., leads southward of Cross ledge, in mid-channel between Cross point and White rock.

Boulder ledge, of sunken rocks, with depths of 1½ and 5 fathoms, extends 9 cables in a south-easterly direction from Boulder head.

Boulder bank, with 18 fathoms, rock, lies 7 cables S.S.W. from Boulder head.

Surf islet, bearing E. by S., leads southward of the dangers off Boulder head.

North ledges, which uncover at low water, lie northward of the North island group. The north extreme of these ledges lies 6 cables N. by W. ½ W. from North island; and the south extreme 2 cables N.E. of that island.

Beaver bank has 27 fathoms water (least depth found) on it, over a bottom of sand and shells. The centre of this bank lies $2\frac{2}{10}$ miles W. by N. from Low point.

The bank is about one mile long in a north and south direction, with depths of 45 fathoms, gravel, at 2 cables westward, and 114 fathoms, rock, at one mile eastward of the bank in mid-channel, between Low and Jorkins points.

Fogs.—A vessel meeting with a fog in this portion of Milbank sound would find Beaver bank of service, not only as indicating her position, but as affording temporary anchorage.

Sandstone reef, situated close to the shore in the north-western portion of Milbank sound, is a conspicuous narrow ridge, of sandstone formation, about one mile long in an E. by N. and W. by S. direction. The highest portion of this ridge is 4 feet above high water.

The western extreme of Sandstone reef lies 5 cables from the shore of Swindle island, and 1½ miles from the eastern side of Price island.

Soundings.—A run of deep water 8 miles broad, with depths of over 100 fathoms, mud, extends south-westward of Milbank sound. North-westward of this channel the depths decrease to 50 fathoms, and less, off the entrance to Laredo sound, with a bottom of fine sand. South-eastward

the depths are 76 and 80 fathoms, with a bottom consisting of sand, mud, and rock at intervals.

In thick weather, therefore, or if overtaken by fog, when approaching Milbank sound from the south-westward, with average precautions, a vessel's position can be indicated by the deep sea lead.

Within Milbank sound the water is deep, there being depths of 109 and 116 fathoms within its entrance points, the deeper water being on the south-east shores of the sound. In mid-channel there is no bottom at 130 fathoms, and at one mile from the south-east shores of the sound there are depths of 110 and 120 fathoms, rock; those shores, therefore, should be approached with caution.

In the northern and north-western portions of Milbank sound the depths are irregular (21 fathoms rock and 114 fathoms, mud).

The COAST.—Between cape Swain and Sound point the land is low, wooded, and broken into creeks and bays.

PRICE ISLAND, forming the western shore of Milbank sound, has a conspicuous ridge of hills (Jocelyn range) along its eastern shore, from 300 to 600 feet in height. The cluster of islets off Day point are wooded and conspicuous; and from Day point the eastern shore of Price island trends in a N. by E. direction for 4 miles to Aldrich point, and is much broken into small exposed bays.

Boat cove, which affords shelter to boats, is situated half-a-mile northward of Aldrich point. With this exception the coast of Price island, north of Aldrich point, is almost straight and unbroken for 8 miles, in a N.N.W. ½ W. direction to the entrance of Schooner passage.

The eastern shores of Milbank sound are comparatively low and wooded, with pine and cedar trees predominating. In that portion of the sound lie two extensive channels (Mathieson channel and Moss passage), which branch off from Milbank sound eastward and northward of Lady island, respectively. Lady island is low and wooded throughout. The western shores of Dowager island are also low and wooded, but are flanked by high mountains.

The south-east extreme of an island contiguous to Lady island, terminates in a high bold cliff (Boulder head). Cliff island which lies off the south-west side of Dowager island at the entrance to Moss passage is small, 225 feet high, and its south-east extreme terminates in high, conspicuous white cliffs.

North island is rocky, about 150 feet high, with some stunted trees growing on its summit.

Low point, the western extreme of Dowager island, and the south-east entrance point of Finlayson channel, is low and wooded.

The north-western shore of Milbank sound (Swindle island) is high and bold with mountains 1,500 to 2,000 feet high rising immediately over it.

Directions.—Approaching Milbank sound from the south-westward in clear weather, Helmet peak should be kept in line with White rock, bearing N.N.E. ⅜ E., which mark will lead nearly in mid-channel up the sound. When within 2½ miles of White rock, on that line, a vessel bound eastward may steer E. by N. ¾ N. towards Seaforth channel, with Day point astern bearing W. by S. ¾ S., or if bound to the northward a N. by W. course may be steered towards Finlayson channel.

In thick weather, as before mentioned, with average precautions and attention to the deep sea lead, the soundings will indicate the vessel's position.

Bound from Seaforth channel into Finlayson channel, keep Idol point well open to the southward of Surf islet, bearing E. ½ N., until Helmet peak comes open of the west extreme of Mary island bearing N. ¾ E. and then Surf islet should be kept astern bearing E. by S. for 3 miles, which will lead in mid-channel, 1½ miles northward of White rock. From this position Cliff island should be seen open westward of Boulder head, bearing N.N.W. ½ W., and a vessel may steer N.W. by W. ½ W. for 3 miles, or until Low point is seen open westward of the North island group bearing North; thence steer N.N.W. for 3 miles, or until Stripe mountain bears N.E. by N., when it may be steered for on that bearing, and the course gradually altered northward into Finlayson channel.

MATHIESON CHANNEL is an extensive arm of the sea leading many miles northward from Milbank sound, eastward of Lady and Dowager islands, with depths of 103 and 105 fathoms in mid-channel. At the distance of 2½ miles within its south entrance this channel is obstructed by islands, islets, and rocks, and a stranger should, therefore, not attempt to proceed further. From the east entrance to Oscar passage,* by which it communicates with Finlayson channel (*see* page 384), Mathieson channel extends in a N.N.W. direction along the east side of Roderick island for over 25 miles to its junction with Mussel inlet; one arm, about 5 miles long, branching off to the eastward at about 5 miles south of the junction.

Tides.—The flood stream sets to the northward, and divides near the middle of Milbank sound, one portion running towards Finlayson channel, another towards Mathieson channel, and another towards Seaforth channel. The reverse takes place on the ebb.

The strength of tide is variable, but it seldom exceeds one knot an hour in Milbank sound, but increases within the channels to 2 and 3 knots an hour.

* Northward of Oscar pass Mathieson channel has not been surveyed in detail.

ST. JOHN HARBOUR (Cheek squintz) lies on the south-east shore of Milbank sound, nearly midway between cape Swain and Sound point, and, though somewhat confined, affords good anchorage for small vessels.

The harbour is protected at its entrance by a reef of rocks awash and sunken rocks, which form a natural breakwater, and breaks the ocean swell. Eastward of this reef, at the entrance, there is a clear channel, 2 cables wide, with depths of 10 to 30 fathoms.

At 5 cables within the entrance are two small islands, the eastern and smaller one (Wood island) being round, wooded, and conspicuous. The channel eastward of these islands is barely one cable wide abreast Wood island, and leads into Anchor bay, which is the usual anchorage for small vessels. Westward of these islands the channel is wider and leads into Deep bay, which forms the south-west arm of St. John harbour.

There are depths of 9 to 20 fathoms in Deep bay, and 11 to 14 fathoms in Anchor bay.

Rage reef extends 7 cables northward from the west point of St. John harbour, and is about 2 cables wide. This dangerous reef consists of ledges which uncover, and rocks awash at high water; the northern extreme uncovering 4 feet at low water.

Mark islet, 6 feet above high water, lies about midway on the eastern side of Rage reef.

Ledges, which uncover, extend one cable from the eastern shore of the channel leading into St. John harbour.

Directions.—Approaching St. John harbour, cape Swain should be kept well open of the conspicuous quoin-shaped point situated 2 miles northward of the cape, bearing S. ½ W. On no account should Rage reef be approached inside that line, until Wood island (within the harbour), is distinctly seen, and North point bears East. When Wood island is recognised, it should be brought to bear S.S.E. ¼ E., and steered for. Wood island on that bearing should be seen in line with a black high-water rock on the south shore of Anchor bay, with a sandy bay immediately east of the rock.

Anchorage.—Pass half a cable eastward of Wood island, and anchor in 10 to 11 fathoms, sandy bottom, in Anchor bay, with the eastern side of Wood island seen in line with the north extreme of Rage reef, bearing N.W. ½ W., distant 3 cables.

Caution.—At high water, when Rage reef is nearly covered, it is difficult to distinguish the entrance into St John harbour. At half-tide, and at low water, the northern end of that reef and also the dangers

on the eastern side of the channel are visible, and a vessel can be guided clear of them by the eye. That period of the tide is, therefore, the best time for entering St. John harbour.

PORT BLAKENEY,* formed between Mary and Don islands, on the south side of Mathieson channel, about 3 miles within the entrance, is easy of access, and, lying immediately at the head of Milbank sound, may be approached from the south-westward with the swell astern.

At its entrance, between Promise and Rain points, the port is 2½ cables wide; thence it takes a southerly direction for about one mile, terminating in a small creek leading into Seaforth channel.

Cod reefs are a cluster of rocks awash, and sunken rocks, about 2½ cables in extent in a north and south direction at the entrance to port Blakeney. The southern rock of this cluster is 4 feet above high water, and the northern rock with 24 feet water over it lies 3 cables N.N.E. from Promise point, with a clear channel northward of it 1½ cables wide.

Oke reefs, situated about 2 cables northward of Cod reefs, extend 2 cables from the south side of Oke island. The outer detached rock is 3 feet above high water, and between it and Oke island several patches of rock uncover at high water.

Clearing marks.—White rocks off the south end of Lake island, seen in line (astern) with the north end of Passage island (between Lake and Lady islands) bearing W. ½ N., will lead between Oke and Cod reefs. Mark islet, seen in line with Oke island, bearing N.W., by N., will lead eastward of those dangers.

Sand patch, with 24 feet water upon it, is of small extent, and lies nearly in mid-channel about 5 cables within port Blakeney. Helmet peak, seen in line with Promise point, bearing N. by W. ½ W., will lead westward of Sand patch.

Anchorage in 10 to 12 fathoms, sandy bottom, will be found about 5 cables within port Blakeney, with Helmet peak seen just open of Promise point bearing N. by W. ½ W., and Observation point on the north shore of East bay bearing E. by N. ½ N.

Tides.—It is high water at full and change, in port Blakeney, at noon; springs rise 13 feet, neaps 8 feet.

Supplies.—Wood and water may be obtained in port Blakeney. Rock cod and other fish may be caught in abundance on Cod reefs, and clams and cockles in the sandy bays. They are readily obtained at low water by digging in the mud and sandy ground, especially in those

* *See* Admiralty plan:—Port Blakeney, on sheet of plans, No. 1462; scale, *m* = 3 inches.

places over which a fresh-water stream runs. Wild fowl are also plentiful in the season.

Directions.—Approaching port Blakeney from the southward, Helmet peak should be kept just open of the eastern point of Lady island (Long point) bearing N. by E. ½ E., and when within 5 cables from the latter a N.E. ½ N. course should be steered towards Oke island. The clearing mark before mentioned for leading between the Oke and Cod reefs should be brought on astern, namely, White rocks, in line with the north end of Passage island bearing W. ½ N. and when Mark and Oke islands are seen in line bearing N.W. by N. a vessel will be eastward of Cod reefs, and may then haul into the harbour with the south extreme of William island astern, bearing North, and anchor in the depth and position before mentioned.

MOSS PASSAGE (Too witl) leads northward of Lady island into Mathieson channel. At its western entrance this passage is over one mile wide; but at 3 miles within this entrance, and one mile from its junction with Mathieson channel, it is contracted by Squaw island to barely one cable. Beyond that position, therefore, it should not be attempted by a stranger.

Bird rock, situated at the western entrance of Moss passage, 3 cables E. by S. from the south extreme of Cliff island, is 3 feet above high water with foul ground extending from it 2 cables to the eastward. The south extreme of the North island group seen just open southward of the south extreme of Cliff island, bearing W. by N. ½ N., leads southward of Bird rock.

MORRIS BAY,* situated on the south side of Moss passage, about one mile within its western entrance, is 2½ cables wide, and extends in a south-easterly direction for 3 cables, terminating in a cul-de-sac which dries at low water. Westerly winds send a swell into the anchorage; but the bay possesses the great advantage of permitting the state of the weather in Milbank sound being ascertained when at anchor, and if fog be prevalent (as is often the case) it can be seen from Morris bay.

Kitty patch lies at the eastern entrance to Morris bay, one cable from the eastern shore. This bank is one cable in extent north and south, with depths of 4 and 5 fathoms, sand.

Directions.—Approaching Morris bay, a mid-channel course should be kept between Bird rock and Salal point; and if Vancouver rock be uncovered, it should be kept astern bearing S.W. by W. (westerly).

* *See* plan of Morris bay on Admiralty chart No. 1,462; scale, $m = 4{\cdot}12$ inches.

When the south extreme of Cliff island is seen open northward of Bird rock, bearing W. ½ N., that mark kept on astern will lead to the entrance to Morris bay.

Anchorage will be found in 12 to 14 fathoms, sandy bottom, at one cable from the western shore, with Salal point shut in by the western entrance point of Morris bay, bearing W. by S. ½ S., and Detached island (north side of Moss passage) bearing N.N.W.

Supplies.—Good water may be obtained in Morris bay. Clams and cockles can be gathered in abundance. Plover and other birds frequent Bird rock. Berries grow in abundance on Salal point.

ALEXANDRA PASSAGE lies northward of Vancouver rock and the North island group. Small steam vessels, possessing local knowledge, make use of Alexandra passage, especially when coming from the northward and wishing to anchor in Morris bay; but this passage is barely 6 cables wide in its narrowest part, and in the event of an accident to the machinery a vessel using it would be in a dangerous position.

Cliff island (*see* p. 378) is nearly steep-to, but the small islet close northward of it has foul ground extending from it one cable to the westward.

Soundings.—The depths in Alexandra passage are 14 to 42 fathoms, rocky at the former, and mud at the latter depth.

Directions.—A vessel compelled by circumstances to make use of Alexandra passage should keep the western shore of Finlayson channel north of Jorkins point in line with Low point, bearing N. by W. ¾ W., which is the general leading mark through this passage. It is, however, recommended alternately to open and close those points, especially when nearing North island group, so as to keep in mid-channel.

SCHOONER PASSAGE, leading from Laredo sound into the north-west corner of Milbank sound, is obstructed by islands, islets, rocks, and sunken dangers, and no specific directions can be given for it. It is occasionally, however, made use of by small coasting craft, and the large canoes of the Queen Charlotte islanders also pass through it when making the passage to Vancouver island.

FINLAYSON CHANNEL, the entrance to which is between Jorkins and Low points, extends from Milbank sound in a northerly direction for 3 miles, and thence in a general direction N.N.W. ¼ W. (westerly) for 18 miles, and thence N. ½ E. 6 miles to the head of Carter bay, with an average width of one to 2 miles. The land on both sides is from 1,000

to 3,000 feet high, the peaks closely approaching the shores and rising in a precipitous manner from the water's edge. Unless where the vegetation has been denuded from the mountain sides by landslips, both shores are thickly wooded, the pine and cedar predominating; occasionally their dark green foliage is relieved by the bright light green leaf of the maple.

Landmarks.—Stripe mountain lies at the south-east entrance to Finlayson channel (*see* p. 375). The summit of Cone island (Bell peak), together with two high waterfalls which fall into the sea on the south-east side of Sarah island, are the principal landmarks of importance.

Soundings.—A depth of 40 fathoms, rock, was found in mid-channel abreast the north extreme of Cone island, but in the greater part of the channel there is no bottom at 153 fathoms.

Oscar passage, 4¼ miles north of Low point, leads eastward out of Finlayson channel, between Dowager and Roderick islands, and is about one mile wide, and 6 miles long to its junction with Mathieson channel. There is no bottom at 38 fathoms in mid-channel in Oscar passage.

Bulley bay, situated on the south shore of Oscar passage, [illegible] miles within its western entrance, though small, affords temporary anc[illegible] in 15 fathoms, at one cable from the shore, and is occasionally used by coasting vessels.

The Sisters, two small islets, lying 2 cables from the eastern shore of Finlayson channel, 3¼ miles northward of Oscar passage, are wooded and about 90 feet high. They lie north-west and south-east 4 cables from each other, and are joined by ledges which uncover at low water.

NOWISH (Otter cove)* lies 5 cables northward of the Sisters islets, between Indian and Susan islands. The entrance, northward of Indian island, is 2 cables wide; the cove then extends in a E.S.E. direction for 5 cables, narrowing near its head, to one cable wide, and having on its north shore, about 4 cables within the cove, a small bay, which affords anchorage for small vessels in 10 to 14 fathoms, sandy bottom, in the middle of the bay.

Tides.—It is high water, full and change, in Nowish cove, at 12h. 0m.; springs rise 12 feet.

Jackson passage, an unexplored arm on the eastern shore of the channel, is 2 cables wide, and extends in an easterly direction from its entrance.

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* *See* Admiralty Plan:—Nowish cove, on sheet of plans, No. 1462; scale, m = 4 inches.

Mary cove, situated on the eastern shore, 5¼ miles northward of the Sisters islets, is barely one cable wide at its entrance, and extends in a northerly direction for 5 cables, terminating in a sandy beach. There are depths of 24 and 7 fathoms in mid-channel within this cove; and at 2 cables southward, 130 fathoms, rock.

CONE ISLAND, on the western shore of Finlayson channel, is 3½ miles long in a N.W. ½ N. and S.E. ½ S. direction, and about 5 cables broad. The summit of this island, situated about one mile from its south extreme, is conical in shape, 1,280 feet high; the eastern and western sides are abrupt and precipitous; but the land slopes gently to the northward terminating in Wedge point.

KLEMTOO PASSAGE,* between Cone and Swindle islands, is about 3½ miles long in a north-west and south-east direction, and in some parts barely one cable wide. Its southern entrance, one cable wide, extends in a N.W. ¼ W direction for about one mile; thence in a general direction N.W. ¾ N. for 2½ miles, to abreast the north extreme of Jane island. The depths in mid-channel are 10 and 30 fathoms, sand and shells, with rock at intervals. Though narrow, this passage is safe (provided a mid-channel course be kept), and affords anchorage almost throughout.

Anchorage, suitable to vessels of moderate length, will be found north of Star islet, nearly in mid-channel, one cable from the shore of Cone island, at 1¼ miles within the eastern entrance, in 12 fathoms, sand and shells.†

Tides.—It is high water, full and change, in Klemtoo passage, at noon; springs rise 13 feet, neaps 8 feet, and the neaps range 3 feet. The tidal streams are comparatively weak. The flood stream is but little felt, the great body of water passing into Finlayson channel. The ebb seldom exceeds the rate of one mile an hour.

South passage, between Cone and Jane islands, is 5 cables wide, with depths of 18 and 37 fathoms, rock.

Kelp patch, with only 5 to 12 feet over it, lies one cable to the southward of Jane island, and is about one cable in extent in a south-east and north-west direction.

Berry point (north side of Swindle island), seen just open of Legge point (south side of Cone island) bearing S.S.E. ¾ E., will lead southward and westward of Kelp patch.

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* *See* Admiralty plan: — Klemtoo passage and anchorage, on sheet of plans, No. 1,462; scale, $m=4$ inches.

† A vessel using this anchorage should be prepared for a foul anchor when weighing.

Wedge rock uncovers at low water, and lies 50 yards from the north extreme of Cone island.

Ripple bank, with 11 fathoms rocky bottom, lies nearly in mid-channel of South passage.

NORTH PASSAGE, between Jane and Sarah islands, is 5 cables wide, with depths from 22 fathoms to no bottom at 38 fathoms.

Danger patch, with one to 3 fathoms water over it, lies one cable north-westward of Jane island.

Directions.—When proceeding through South passage, the south shore should be kept on board, passing 2 cables northward of Cone island. North passage is to be preferred to South passage when communicating between Finlayson and Tolmie channels. Keep nearer the north shore, and pass 2 cables south of Sarah island.

JANE ISLAND, situated 5 cables north-west of Cone island, is about one mile long in a N.W. and S.E. direction, and 5 cables broad. It is low and wooded, the tops of the trees being 200 feet high.

Sarah island, the south point of which is 6 cables northward of Jane island, is 15 miles long in a N.N.W. and S.S.E. direction, and one mile to 2½ miles broad. This island reaches its greatest elevation of 2,000 feet at 4 miles from its south extreme. On the south-east side of the island, at 7 miles from the south extreme, an unexplored bay faces south-eastward, and at 3½ miles from the south extreme of Sarah island, on its eastern shore, there are two high waterfalls.

Watson bay lies on the eastern side of Finlayson channel, 9 miles northward of Sisters islets. This unexplored bay is one mile wide at its entrance, and extends in an easterly direction.

Wallace bight lies 2½ miles northward of Watson bay. It is one mile wide at its entrance, and takes a northerly direction for one mile. There is no bottom at 106 fathoms, between its entrance points.

Goat cove, situated 4 miles northward of Wallace bight, is 5 cables wide, and extends in an easterly direction for 5 cables, terminating in a sandy beach. There are depths of 23 to 34 fathoms within this cove, the former being close to the head.

Sheep passage is nearly one mile wide, and leads eastward from Finlayson channel, just south of Carter bay. At 3 miles within its western entrance, it trends northward until its junction with Mussel inlet.

MUSSEL INLET, which has not been explored since Vancouver's visit in 1793, takes a N.N.W. direction for about 5 miles, when it suddenly

turns to the eastward for about the same distance, terminating in Poison cove.* It is stated to have the same general characteristics as the other inlets.

CARTER BAY.†—This excellent stopping place lies at the head of Finlayson channel, 26 miles within its entrance, and is easily recognised by the high cliffs on its western shore. The bay is 4 cables wide at its entrance, abreast the anchorage ground, and about 6 cables deep in a northerly direction, the head terminating in a large stream, fronted by an extensive flat. This stream takes a north-easterly direction for about one mile, to the foot of a waterfall, at the entrance of a lake.

Anchorage will be found in 14 to 15 fathoms, mud bottom, at $1\frac{1}{2}$ cables from the eastern shore, and 2 cables from the sand flat at the head of the bay; with the entrance points of the bay bearing S.E. $\frac{3}{4}$ S. and S.S.W. $\frac{1}{2}$ W. respectively.

Supplies.—Water can be obtained from the large stream at the head of the bay, which is probably one of the best watering places along the coast. Trout abound in the fresh-water stream. Tracks of bear and deer were seen on the shore. Wild fowl frequent Carter bay. Shell fish, of whatever kind, should not be eaten.

Tides.—It is high water, full and change, in Carter bay at noon; springs rise 13 feet.

HIE KISH NARROWS lie northward of Sarah island, and lead from Finlayson channel into Graham reach. This channel is about $5\frac{1}{2}$ miles long, in a general N.W. and S.E. direction, and from $2\frac{1}{2}$ cables to one mile wide. The western part of Hie Kish narrows lies about half a point more west and east than the eastern part. The depths in the narrows are 31 and 73 fathoms in mid-channel, with a bottom of sand and shells.

Hewitt rock, a dangerous sunken rock with only 10 feet over it, and deep water close to, lies at the western entrance of Hie Kish narrows nearly in mid-channel.

The north shore of the channel should be kept on board when navigating the western portion of Hie Kish narrows. The south

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* So named by Vancouver, owing to several of the crew of the *Discovery* being poisoned by eating mussels found there.

† *See* Admiralty plan :—Carter bay, on sheet of plans, No. 1901; scale, $m = 4$ inches. It was so named by Vancouver, from a seaman of the *Discovery*, named John Carter, having died here in June 1793, from eating poisonous mussels (at Poison cove). The mussels, however, were said to have been gathered on the sand and not on the rocks (Vancouver's Voyages, Vol. II., pp. 285-6).

point of Carter bay, seen just open of the north extreme of Sarah island, bearing S.E. $\frac{3}{4}$ E., leads northward of Hewitt rock.

TOLMIE CHANNEL, situated between Princess Royal and Sarah islands, is about 15 miles long in a general N.N.W. and S.S.E. direction, and from one-half to one mile wide, with depths of from 35 fathoms to no bottom at 104 fathoms. From a position in mid-channel abreast the north end of Jane island, Tolmie channel extends N.W. $\frac{3}{4}$ N. for 5 miles, to abreast a small islet on the north shore, thence N.N.W. for 10 miles, to its junction with Fraser reach.

On the west shore, $2\frac{1}{2}$ miles northward of south point of Sarah island, an extensive arm takes a southerly direction, and is reported to communicate with Laredo sound. Abreast the north-eastern point of this inlet, a small islet lies close to the shore of Sarah island.

Caution.—The northern reach of Tolmie channel looks directly into this inlet, care is therefore necessary when approaching from the northward not to mistake this unexplored arm for the reach leading to Klemtoo passage.

At 2 miles northward of the above-mentioned inlet, on the west shore of Tolmie channel, lies another unexplored passage, facing the south-east.

Tolmie rock, on which is only 4 feet water, lies 100 yards from the shore of Sarah island, at 5 cables within the northern entrance of the Tolmie channel.

Directions.—Tolmie channel, though not so wide as Finlayson channel, is preferable in some respects, especially if compelled to be under way at night. A mid-channel course should be steered throughout except when navigating the northern part of the channel, when the west shore should be neared to avoid Tolmie rock.

Tides.—The flood stream sets to the northward, and is stronger in Finlayson than in Tolmie channel. The ebb, however, is stronger in Tolmie channel, and runs for $1\frac{1}{2}$ hours after the ebb has ceased in Finlayson channel. In the narrow parts of these channels, both flood and ebb streams attain a velocity of 5 knots an hour at springs.

In Klemtoo passage, the flood stream is but little felt, the great body of water passing into Finlayson channel. The ebb stream seldom exceeds the rate of one mile an hour.

GRAHAM REACH, situated northward of the junction of Tolmie channel with Hie Kish narrows, is about 17 miles long, in a general N.W. by N. and S.E. by S. direction, and from one-half to one mile broad, with depths of 38 fathoms, rock, and 150 fathoms, sand and shells. From the north-west extreme of Sarah island this reach takes a N.W. by N.

(northerly) direction for 7 miles, to abreast Swanson bay, thence it takes a N.W. ¼ N. direction for 10½ miles to abreast Red cliff point. In general features this reach resembles Finlayson channel.*

Green inlet lies on the north shore, 2 miles northward of Sarah island. This unexplored arm takes an easterly direction at its entrance.

Flat point lies on the west shore, 3 miles westward of Green inlet. This point is wooded, flat, and comparatively low. Abreast Flat point, on the south shore of the channel, is a remarkable large boulder rock.

Dangers.—There are no known dangers at one cable from the shore in this reach.

SWANSON BAY lies on the north shore, 7 miles from Sarah island. There is a conspicuous waterfall on the south shore of the channel abreast Swanson bay.†

Anchorage may be obtained in 19 fathoms, sandy bottom, in the northern part of Swanson bay, with the conspicuous waterfall on the south shore shut in with the north entrance point, and Flat point shut in with the south entrance point of the bay.

Khutze is an unexplored arm, on the north shore, 6 miles westward of Swanson bay. It is 5 cables wide, and lies in a N.E. by E. direction from its entrance.

Anchorage is reported by Indians at the head of this inlet.

Aaltanhash is another inlet on the north shore, unexamined by the Admiralty Survey, 2 miles westward of Khutze. In size and direction it is similar to Khutze, and is reported by Indians to afford anchorage.

Tides.—The tides meet abreast Aaltanhash inlet.

Red cliff point, the turning point into Fraser reach, lies on the south shore, 17½ miles from Sarah island. This point terminates in a conspicuous cliff of a reddish brown colour ; and is a good landmark.

FRASER REACH, the channel north-westward of Graham reach is 12½ miles long in a general W. by N. and E. by S. direction, and one half to 1½ miles wide, with depths of 62 fathoms, rock, to no bottom at 145 fathoms. In features it resembles Finlayson channel.

Warke island is 1½ miles long in an east and west direction, and half a mile broad. The east extreme of this island lies one mile W.N.W. from Red cliff point. The channel on both sides of the island is deep, but that to the south is slightly the wider. There is a bay on the south shore

* At 5½ miles north-west of the north point of Sarah island and close to the western shore of Graham reach is a small low islet.

† In very dry summers this is reduced to a very small size, and even occasionally ceases altogether.

of the channel, abreast Warke island, at the head of which is a fine trout stream, communicating with a large lake. Fraser reach from abreast Warke island takes a W. by N. direction for 5 miles, thence W.N.W. for 6 miles to abreast Kingcombe point.

Klekane, an unexamined arm on the north shore, abreast Warke island, is 5 cables wide, and takes a N.W. direction from its entrance. Approaching from the south-eastward this arm appears as the continuation of Graham reach.

Anchorage may, from Indian report, be obtained at the head of Klekane inlet.

Landslip point lies on the north shore, 4 miles westward of Warke island. Over this point is a remarkable landslip.*

Kingcombe point, the turning point into McKay reach, lies on the south shore 12 miles from Red cliff point. The point is long, sharp, and conspicuous.

McKAY REACH leads westward from Fraser reach into Wright sound, is about 8 miles long in a general W.S.W. and E.N.E. direction, and from one mile to 2 miles wide; there is no bottom in mid-channel at 139 and 225 fathoms, the latter depth being found at 2 cables southward of Cumming point.

From mid-channel abreast Kingcombe point, the reach takes a W.S.W. direction for 4 miles to abreast Trivett point; thence a S.W. by W. direction for 4 miles to abreast Cumming point. Westward of Kingcombe point, a deep bay lies on the south shore, between Kingcombe and Trivett points.

The land on the north shore of the channel is high and bold, with mountains 3,000 feet high. The land on the south shore is not so high; and near the summits of the mountains are some extensive bare patches of slate colour.

GRIBBELL ISLAND, the shores of which have not been surveyed in detail, is of somewhat rectangular form, about 11 miles long (north and south), and 7 miles wide. The Wimbledon mountains, along its south shore, are from 2,000 to 3,000 feet high.

URSULA CHANNEL.—Between Pilot point, the south-east point of Gribbell island, and Fisherman cove, on the opposite shore, is the entrance to Ursula channel which skirts the east side of Gribbell island for about 7 miles. Its shores are composed of steep lofty mountains rising abruptly from the sea, and covered with pines and forest trees.

* "This landslip is now so much grown over, as not to be more conspicuous than others near it."—Lieutenant E. L. Lang, R.N., H.M.S. *Mutine*, 1883.

Fisherman cove, on the east shore at the entrance to Ursula channel, affords indifferent anchorage in 30 fathoms, with the south point of the bay (a clump which is connected to the shore by a sandy neck covered at high water) bearing S. ¼ W. Vessels anchoring here must feel their way with the deep sea lead as the water shoals very suddenly from 30 fathoms to 12 fathoms, the latter depth being at about 25 yards from the shore. A small stream flows into the head of the cove, off which a shoal extends some distance, its edge being very steep.*

At 2½ miles northward from Fisherman cove is a small inlet where a hot spring was discovered. The colour and taste of which resembled the waters at Cheltenham.†

Boxer reach, the continuation of Ursula channel in a W.N.W. direction along the north-east and north sides of Gribbell island, is about 6 miles long. On its north shore good anchorage may be found in the north-west part of Bishop cove in from 15 to 20 fathoms.

Bishop cove is a very good anchorage, and is formed by a narrow neck of sand running out from the land terminated by a clump covered with trees, similar to that at Fisherman's cove. H.M.S. *Devastation* anchored on the north-west side of it, with the clump bearing E.S.E. distant about one-third of a mile. The water shoals gradually up to the sandy neck and a vessel might go into 15 fathoms.

There appears to be anchorage on the south-east side of the sandy neck, but the beach runs out shoal a long way on that side.‡

Verney passage, along the west shore of Gribbell island, takes a northerly direction from Money island, off its west entrance point, for about 8 miles, and communicates with Boxer reach; its shores have not been surveyed.

DEVASTATION CHANNEL.—From the junction of Verney passage and Boxer reach at the north point of Gribbell island, the channel continues northward along the east side of Hawkesbury island for a distance of 20 miles, and is known as Devastation channel: its shores have not been surveyed.

GARDNER CANAL, the entrance to which is on the east side of Devastation channel, about midway along it, turns off at Staniforth

* A very indifferent anchorage, barely room for the ship to swing should the wind come from the northward. The stream which flows into the head of the cove kept the vessel from swinging in.—Commander J. Nicolls, R.N., H.M.S. *Cormorant*, November 1886.

† Vancouver's Voyages, Vol. ii., p. 299.

‡ Remark book of Mr. F O. Simpson, Master H.M.S. *Devastation*, 1863.

point to the eastward, in which direction it continues, with many sinuosities, for upwards of 45 miles. "The land is an entirely barren "waste, nearly destitute of wood and verdure, appearing as a mass of "almost naked rocks rising to rugged mountains whose towering summits "appearing to overhang their bases give them a tremendous appearance, "covered with perpetual ice and snow."* Its shores have not been surveyed in detail, but there is reported to be anchorage on either side of Richardson point, on the south shore (south-east of Channel island), about 6 miles from the entrance, in from 18 to 5 fathoms; and also at Kemano bay on the north shore, 20 miles farther up, but here the anchorage is said to be indifferent, as the water is deep and shoals very rapidly from no bottom at 25 fathoms to 3 fathoms. A vessel may anchor in Kemano bay in 15 fathoms with Green point bearing S. by W. and Entrance bluff S.E. ¼ S., but great caution is required in picking up a berth, and when entering vessels should keep over towards the eastern entrance point (Entrance bluff), as shoal water extends for some distance from the opposite point.

The Kemano river flows through an extensive valley into the head of Kemano bay, and is a stream of some size, navigable in the summer by canoes for a distance of 8 miles from its mouth. Kemano bay is frequented by the Kitlup indians during the houlican fishing season; their village, however, is at the head of the inlet. Bears are reported to be abundant in the Kemano valley, and mountain sheep in the mountains, but a scarcity of deer. Firewood can be obtained from the Indians at a moderate price.

In the winter months ice forms at 25 miles from the head of Gardner canal.

Tides.—It is said to be high water, at full and change, in Kemano bay at 1 hr. p.m. (June); springs rise about 9 feet.

Kitimat arm.—From the north end of Hawkesbury island the inlet continues in to a northerly direction for a further distance of about 17 miles to about lat. 54° 2′ N., where it is terminated by a border of low land with a shallow flat extending from side to side, through which a small rivulet discharges itself at the eastern corner, navigable only for canoes. This termination differs in some respects from many of the others; its shores are not very abrupt but are bounded on each side by a range of lofty mountains, which, however, are not (as is constantly the case) connected at the head of the arm, but continue apparently in a direction parallel to each other. The valley between them, which is 3 or 4 miles wide, being covered with trees, mostly of the pine tribe.† Two

* Vancouver's Voyages, Vol. ii., p. 302.

† Vancouver's Voyages, Vol. ii., p. 304.

Indian villages of the Kitimat tribe are situated near the head of this arm.

Clio bay, on the east shore of the Kitimat arm, has been visited on several occasions by H.M. ships for the purpose of communicating with the Kitimat Indians, and affords anchorage in 17 fathoms.

Kildala arm extends in an E.N.E. direction for about 10 miles, branching off from the east side of Kitimat arm at about 11 miles from its head.

DOUGLAS CHANNEL, which extends along the west shore of Hawkesbury island for upwards of 25 miles in a northerly direction, leading into the Kitimat arm at its junction with Devastation channel, has not been surveyed. "It is about 3 miles broad, and the shores are very high."* Kit kin tah, an unexplored inlet, branches off from the west side of Douglas channel in a south-westerly direction at 6 miles from Money point, its south-east entrance point. Small vessels may anchor in 5 fathoms half a mile within Kit kia tah inlet.

WRIGHT SOUND, a sheet of water 9 miles long in an east and west direction, and 2¼ miles wide at its narrowest part, lies between Gribbell and Gil islands, with no bottom at 119 and 220 fathoms.

It communicates eastward with McKay reach, and westward with Grenville channel. Whale channel and Lewis passage lead southward, and Douglas channel and Verney passage lead northward from Wright sound.

Landmarks.—Gil island on the south side of the sound culminates in a well defined snow-clad peak 3,000 feet high. (*See* page 445.)

The mountains north-eastward of Holmes bay have bare patches down their sides.

Directions.—In thick weather, when the shores are almost obscured to the water's edge, Wright sound, with its different openings, north and south, makes a very perplexing picture to a stranger. Under such circumstances it is well to remember that a due West course leads across the sound from McKay reach to Grenville channel; the distance from point Cuming to Yolk point being just 7½ miles.

Promise island, on the north side of the sound, with its two dome-shaped mountains, and cape Farewell, the south-east extreme of the island, are conspicuous.

HOLMES BAY (Quel ak se ax),† situated on the eastern shore of Wright sound at the entrance of Whale channel, is 8 cables wide at its

* Remark book of Mr. F. O. Simpson, Master, H.M.S. *Devastation*, 1863.

† *See* Admiralty plan :—Holmes bay, on sheet, No. 1,901; scale, *m* = 5·5 inches.

entrance, and recedes in an easterly direction for about 4 cables, terminating in a sand flat, which extends one cable from the head of the bay.

The north entrance point is high and bold, and a small islet lies off the south entrance point of the bay.

Anchorage will be found in 14 fathoms, sand, with the south extreme of Promise island in line with the north point of the bay, bearing W. by N. ½ N.; and Gil mountain in line with the south entrance point, S.W. by W.

Tides.—It is high water, full and change, in Holmes bay at 1 h.; springs rise 13 feet, neaps 10 feet.

Fisherman cove was the name given by Vancouver to an anchorage one mile eastward of Turtle point, close to the shore of Gil island. The water is deep, and the anchorage reported indifferent.

PROMISE ISLAND, at the south end of Douglas channel, is 3¼ miles long in a N.N.W. and S.S.E. direction, with an extreme breadth of 2 miles; it is covered with pine and cedar, and culminates in two peaks of dome-shape, 1,680 and 1,710 feet high respectively. Cape Farewell, the south-east extreme of the island, terminates in a high, bold cliff. A conspicuous white cliff lies on the south shore, midway between cape Farewell and Thom point.

The east shore of the island is high, with an occasional bay with a sandy beach at its head. Dawson point, the north extreme, is low and wooded.

Farewell ledge uncovers at low water, and extends 2 cables south-east from cape Farewell. This ledge is nearly steep-to, there being no bottom at 40 fathoms at 30 yards from it. Ledges extend one cable from the eastern shore of Promise island.

Dawson ledge extends 2 cables northward from Dawson point, and uncovers at half ebb.

COGHLAN ANCHORAGE,* between the mainland and Promise island, situated about one mile westward of cape Farewell, is 3 cables wide at its entrance between Camp and Thom points, and extends in a north-west direction for 2 miles, widening within the entrance to 4 cables.

Thom ledge extends 100 yards south-west of Thom point (the eastern entrance point of Coghlan anchorage).

Promise ledge extends 50 yards from Promise point.

Observatory ledge extends 100 yards eastward of Observation point.

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* *See* Admiralty plan :—Coghlan anchorage, on sheet of plans, No. 2,189; scale, $m = 3{\cdot}25$ inches.

Harbour rock is a dangerous rock of small extent, which uncovers 6 feet at low water, and lies nearly in mid-channel near the head of the harbour. This rock is nearly steep-to, there being depths of 10 and 18 fathoms at 100 feet from the rock.

Gil mountain seen in line with Thom point, bearing S.E. ¼ E., will lead north-east; and Camp point (west entrance point of Coghlan anchorage) seen just open of Observation point, bearing S.E. ¼ S., will lead westward of Harbour rock.

Otter shoal extends 100 yards from the western shore at the head of the anchorage, with depths of 3 fathoms and less upon it.

Soundings.—Southward of Observation point there are depths of 24 to 40 fathoms; northward of that point 19 to 7 fathoms, sand.

Anchorage in 6 to 7 fathoms sand, will be found near the head of Coghlan anchorage, with Gil mountain just shut in with Thom point, bearing S.E., and Stephens point just open of Letitia point (Stewart narrows) bearing N.E. by N. Or, for a long vessel, or if not wishing to go beyond Harbour rock, a berth, in 24 fathoms, in mid-channel, at 5 cables south-east of Observation point, may be found.

Directions.—When entering keep in mid-channel, to avoid the ledge which uncovers off Thom point, and proceed to the anchorage with the leading mark above given for clearing Harbour rock on astern; and anchor as before directed.

Stewart Narrows lead northward of Promise island into Douglas channel. The tides in this passage are strong, and the channel confined; it is therefore not recommended.

Tides.—It is high water, full and change, in Coghlan anchorage at 0h. 30m.; springs rise 18 feet, neaps 14 feet.

Tidal streams.—The flood stream which enters Campania sound from the southward, divides off Passage island, and the main body of water passes up Squally channel. The lesser body, passing into Whale channel, skirts the north shore of Gil island, and unites, at one mile northward of Turtle point, with the main body of water which has entered Wright sound by Lewis passage. The flood stream from that position, sets directly across Wright sound, and impinging on Camp point causes very strong eddies off that point, and is then deflected towards Grenville channel.

A portion of the flood stream by Whale channel turns into McKay reach, and meets, abreast of Aaltanhash inlet, the flood stream from the Finlayson channel. Another portion proceeds into Douglas channel and Verney passage. On the ebb, the reverse takes place, the main body of water from Wright sound obtaining an exit by Whale channel.

The ebb streams from Wright sound, Douglas channel, and McKay reach, unite nearly midway between Maple point and Holmes bay, setting directly towards the latter, producing strong eddies at the mouth of Holmes bay. Thence the stream sets fairly through Whale channel, and passing north and south of Passage island, unites with the stream of Squally channel, and united they pass out into Campania sound.

Both flood and ebb streams attain the velocity of 3 knots an hour, at springs, in the contracted portions of the channels.

GRENVILLE CHANNEL leads north-westward out of Wright sound, and is the usual channel taken by steam vessels when proceeding to the northern waters of British Columbia.

At its south-east end Grenville channel abreast Yolk point is 8 cables wide, thence it extends in a W. by N. ½ N. direction for 4 miles to abreast Davenport point, with an average width of one mile. From this point the channel takes a W.N.W. direction for 11 miles, and narrows to 3 cables as Lowe inlet is approached, seldom exceeding 4 cables in width until north-westward of Evening point (Klewnuggit). From a position in mid-channel one mile westward of Lowe inlet, Grenville channel takes a N.W. by W. ¾ W. direction, for 7 miles to abreast Evening point, thence it widens out to one and 3 miles; and extends W.N.W. for 23 miles, to abreast Ogden channel. The depths in Grenville channel are 48 to 133 fathoms, rock.

The land on both sides is high, reaching an elevation of 3,500 feet on the north, and from 1,000 to 2,000 feet on the south shore; and for the most part is densely wooded with pine and cedar.

The mountains rise almost perpendicularly from the water, and cause the southern portion of this narrow channel to appear even narrower than it is (3 cables). But the general effect of so many mountains rising one behind the other, renders the Grenville passage one of the most beautiful landscapes on this coast; and is equalled only by Klemtoo passage.*

Grenville channel is comparatively free from danger, at half a cable from either shore, with the following exception:—

Morning reefs extend N.W. by W. nearly one mile from Evening point, and 5 cables from the north shore of Nabanhah bay. The south shore of Grenville channel must be kept on board when passing Morning reefs.

Bare islet (north side of Klewnuggit inlet) kept open of Camp point (south side of that inlet) bearing N.E. ¾ E. will lead westward of Morning reefs.

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* The tides in Grenville channel are weak, in most parts not exceeding one knot; the flood stream from the northward meeting that from the southward abreast Nabanhah bay.

The only directions necessary for navigating Grenville channel are to keep in mid-channel, except when passing Nabanhah bay, and then the south, or Pitt island, shore should be kept on board.

LOWE INLET,* situated on the north shore of Grenville channel, about 14 miles from Wright sound, is a little over 2½ cables wide at its entrance between James and Hepburn points. From mid-channel, between the entrance points, the inlet extends in a N. by W. direction for 5 cables; thence N.N.E. for 6 cables to the mouth of Nettle basin, and widens to 4 cables.

Nettle basin is nearly circular in shape, and is 5 cables across; but between its entrance points the basin is barely one cable wide.

In the north-east corner of Nettle basin is a large stream, with a waterfall close to its mouth, and several others within (Verney falls). This stream is reported to be connected by a chain of lakes with Kit kia tah inlet (Douglas channel).†

Landmarks.—On the south shore, at 2 miles eastward of Lowe inlet there is a remarkable bare hill, 400 feet high.

Tom islet, a small and wooded islet, lies close to the north shore, at 2 cables westward of Lowe inlet.

On the south side of the inlet a remarkable mountain, with a conical summit (Anchor cone), rises to the height of 2,010 feet. From its summit, the land slopes northward and south-westward. The latter spur terminates in the eastern entrance point of Lowe inlet; and when seen from the eastward, appears as a long, low, wooded projection. Over the north-west shore of the inlet, mountains with bare summits rise to the height of 2,000 feet.

High-water rocks, situated one cable from the western shore, at 4 cables within Lowe inlet, are awash at high water, and lie close to each other in a north and south direction. There is a depth of 23 fathoms, at 100 feet eastward of the rocks.

Don flat, with depths of 3 fathoms and less upon it, extends one cable from the head of the bay south of Don point, on the eastern shore.

Whiting bank, at 2 cables within the mouth of Lowe inlet, has depths of 10 fathoms and less on it extending across the entrance. Northward of that position the water deepens to 19 and 20 fathoms, mud. Within Nettle basin, the general depths are 15 to 17 fathoms, mud.

Anchorage for vessels of moderate length will be found, in mid-channel, on Whiting bank, in 8 and 10 fathoms, sand and shells. In this position, Anchor cone mountain should bear E. by N.; and the eastern

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* *See* Admiralty plan :—Lowe inlet, on sheet of plans, No. 2,189; scale, $m = 3 \cdot 75$ inches.

† About one mile and a half from Lowe inlet, on the Pitt island shore of Grenville channel, is an unexamined cove.

entrance point of the harbour (Hepburn point) S.E. by S. For a long vessel, more convenient anchorage will be found higher up the harbour, in mid-channel, in 20 fathoms, mud bottom, with Anchor cone mountain bearing S.E. by E.

Supplies.—Good water can be procured in Lowe inlet, from the stream in Nettle basin. Trout may be caught in that stream, and clams are found on the flat at the eastern shore of Nettle basin. Whiting, in abundance, may be caught on Whiting bank.

Edible nettles grow on the shores of the basin, and are useful as an antiscorbutic when cooked.

Tides.—It is high water, full and change, in Lowe inlet at 0h. 30m.; springs rise 17 feet; neaps 15 feet.

KLEWNUGGIT INLET* lies 9½ miles westward of Lowe inlet, on the north shore of Grenville channel, and one mile westward of Evening point. The entrance between Camp point (south shore), and Leading island is 4 cables wide, and thence the inlet takes an easterly direction for 4 cables, and there divides; the longer arm (Exposed arm) extends in a south-easterly direction for 3 miles, and terminates in a swamp fronted by a sand flat. The shorter arm takes a north-west direction for 1¼ miles, passing northward of Leading island, and is 2½ cables wide.

With the exception of Morning reefs (*see* page 396), Klewnuggit inlet has no dangers beyond one cable from the shore.

Soundings.—The water in Exposed arm is deep, there being no bottom at 38 fathoms. In the north-west arm there are depths of 15 and 24 fathoms, mud bottom.

Anchorage may be obtained in the north-west arm (Ship anchorage) in 15 to 20 fathoms, mud bottom, in mid-channel, at one cable from either shore.

Directions.—Entering Klewnuggit inlet, having cleared Morning reefs (*see* page 396), keep in mid-channel between Camp point and Leading island. Pass 2 cables south-east of the latter, and anchor on its north side in Ship anchorage. In this position the south-east extreme of Leading island should be seen in line with a conspicuous cliff of purple colour, on the south shore of Exposed arm, bearing South.

Tides.—It is high water, full and change, in Klewnuggit anchorage at 0h. 30m.; springs rise 17 feet.

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* *See* Admiralty plan :—Klewnuggit inlet, on sheet of plans, No. 2,189; scale, $m = 3 \cdot 75$ inches.

STUART ANCHORAGE,* situated on the south shore of Grenville channel, 25½ miles westward of Lowe inlet, lies 5 cables westward of a long, low, wooded projection, which serves to distinguish it.

Stag rock uncovers 13 feet at low water, and lies 4 cables W. by N. ½ N. from the above-mentioned point. This rock has foul ground extending from it 4 cables in a W.N.W. direction, and a small patch, which uncovers at low water, lies one cable south from the rock.

The whole of this foul ground is indicated by kelp during summer and autumn.

Anchorage will be found in 10 to 15 fathoms, rock, W. ¾ S. 2 cables from Stag rock; with the south extreme of Gibson island seen touching the north side of Pitt island (Calvert point) bearing W.N.W. northerly.

Directions.—Proceeding for this anchorage, especially at high water, care is necessary. Pass 2 cables westward of the foul ground extending from the Stag rock, and anchor when at one cable to the southward.

Tides.—It is high water, full and change, at Stuart anchorage at 0h. 30m.; springs rise 17 feet.

The tidal streams meet abreast Evening point; eastward of that point the flood approaches from the eastward, and westward of the point from the westward.

At springs the flood stream in the narrow portions of Grenville channel attains the velocity of 2 knots, and the ebb 4 knots an hour. The latter stream continues to run for 1½ hours after low water by the shore. Abreast Lowe inlet, strong eddies will be felt on the ebb.

False Stuart anchorage lies on the south shore 3 miles eastward of Stuart anchorage. On its north-west side there is a high, bold, projection. This point should serve to distinguish False Stuart anchorage from Stuart anchorage, as the latter has a long, low, projection on its south-east side. The water is deep, close to the shore.

Kxn geal, an unexplored inlet on the north shore, 5 cables westward of Evening point, is 5 cables wide at its entrance, and takes a north-west direction.

A rock which uncovers lies 2 cables south-east of the north-west entrance point of Kxn geal inlet.

At the distance of 6 miles W.N.W. from Kxn geal is Baker inlet with a narrow opening, but apparently quite extensive within, and in an easterly direction; a small islet or rock lies in the entrance. From this in a west and

* *See* Admiralty plan :—Stuart anchorage, on sheet of plans, No. 1,901; scale, *m* = 6 inches.

south-westerly direction nearly 3 miles is a narrow but deep opening, which from Grenville channel appears to cut Pitt island in two, and may join the eastern arm of Petrel channel.*

Kum ea lon, an unexplored inlet on the north shore, abreast of False Stuart anchorage, has an entrance 2 cables wide, and takes a northerly direction. Some small islets lie near the north shore of Grenville channel westward of Kum-ea-lon inlet.

Gibson islands, a group, situated in the western portion of Grenville channel, at its confluence with Ogden channel, consists, of one large island 160 feet high, about one mile in extent, and wooded, and several smaller islets and rocks; the shores of the larger island are broken into several bays. On the east side of the large island is Bloxham island, of small extent, and Lamb islet lies one cable from the north-east shore.

Watson rock uncovers 18 feet at low water springs, and lies 2 cables distant from the south shore of the large Gibson island. There is a depth of 47 fathoms, rock, at one cable south of Watson rock.

Bloxham shoal extends 6 cables north-eastward from the south-east extreme of Bloxham island, and passes northward of Gibson islands at that distance, with depths of one to 3 fathoms water over it.

GUNBOAT HARBOUR, between Gibson and Bloxham islands, is a small harbour, which faces the south-east, affording temporary anchorage to small vessels, in 4 to 10 fathoms, one cable within the entrance, in mid-channel.

Bedford island, of small extent, lies 5 cables N.N.W. from the larger Gibson island.

Bedford spit extends 3 cables south-west from Bedford island. The channel between Bedford and Gibson islands has depths of 4 fathoms and less in it; this passage is not recommended.

Marrack island lies 5 cables N.N.W. of Bedford island, and is one mile in extent.

Marrack rock, which uncovers, lies nearly in mid-channel between Bedford and Marrack islands.

Port Fleming.—Between Marrack, Bedford, and Gibson islands, and the mainland eastward of them there is a good harbour named port Fleming, of even soundings, from 3 to 7 fathoms, with muddy bottom, and very little tide. Captain Madden, an old trader and pilot, stated that he always found this harbour good, well sheltered from winds, and free from currents and sea.

* United States Pacific Coast Survey, 1883.

The approach to port Fleming from the north is by Arthur passage.

Good anchorage is reported on west side of Smith island, opposite mount McGrath.

KENNEDY ISLAND* is 5½ miles long in a north-west and south-east direction, with an average breadth of 3 miles, is wooded, rising gradually, and culminates near the middle in two conspicuous peaks, 2,765 and 2,470 feet high respectively. The western and southern shores of Kennedy island are bold, and little broken; the northern shores have not been examined in detail.

Cardena bay, is an open bay on the south-east side of Kennedy island, and is skirted by a mud bank, which extends over 5 cables from the shore, with depths of 5 to 10 fathoms upon it.

In May 1880 there were three houses, a wharf, and an Indian summer village, and also a supply of wood for steamers at this place, which is called Inverness or Aberdeen fishery.

It is a good temporary stopping place in case of fogs or darkness on reaching Chatham sound.

Anchorage may be found on the bank, in 7 to 8 fathoms good holding-ground, at 3 cables from the shore of Kennedy island; and it is the best anchorage in the vicinity of Skeena river, sheltered from North and S.E.

Lewis island, situated one mile southward of Kennedy island, is low, wooded, narrow, and 2½ miles long, in a north-west and south-east direction.

ARTHUR PASSAGE, between Kennedy and Lewis islands, is about 5 miles long, in a general north-west and south-east direction, and about one mile wide, with depths of 18 to 63 fathoms, mud.

Herbert reefs lie on the western side of Arthur passage, about 4 cables from the north-east extreme of Lewis island, and 6 cables distant from Kennedy island. This dangerous reef consists of two rocks which uncover at low water, with depths of 7 and 9 fathoms between them, lying north-west and south-east, distant 5 cables from each other. There are depths of 37 fathoms and over at one cable northward, and of 20 fathoms at one cable southward of Herbert reefs.

The eastern and smaller Genn island seen in line with the south extreme of White Cliff island, bearing N.W. ½ W., leads northward of Herbert reefs.

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* *See* Admiralty plan:—Brown and Edye passages, No. 2,453; scale, *m* = 1 inch.

LAWSON HARBOUR on the north-west side of Lewis island, is about 5 cables long in a north-west and south-east direction, and 5 cables wide.

Anchorage for small vessels may be found in 4 fathoms water, in mid-channel, about one cable within Lawson harbour.

Elliott island, north-west of Lewis island, is low and wooded; about 1¼ miles long in a W.N.W. and E.S.E. direction, with a greatest breadth of three-quarters of a mile.

Bloxam passage, between Lewis and Elliott islands, and connecting Arthur and Chismore passages, is about 2 cables wide, with a depth of 21 fathoms in mid-channel.

Elizabeth island lies westward of Elliott island, is nearly 3 miles long in a W.N.W. and E.S.E. direction, with an average breadth of three-quarters of a mile. With the exception of a hill, 334 feet high, near its eastern end, this island is low and wooded.

Bamfield Islands, a group of small islets, lie about one quarter of a mile from the northern shore of Elizabeth island; 3 cables eastward from these islands are some reefs. A deep but narrow passage exists between Bamfield islands and the reefs.

CHISMORE PASSAGE, between Porcher island on the south and Lewis, Elliott, and Elizabeth islands to the north, is about 4 miles long in a W.N.W. and E.S.E. direction, and from 2 to 5 cables wide, with depths of 4 to 21 fathoms, mud. It is obstructed by foul ground at its south-eastern end, and is only accessible for ships by Bloxham passage, a narrow channel leading into Arthur passage between Lewis and Elliott islands.

Kelp passage, between Lewis and Porcher islands, is available only for boats.

Elizabeth rock, which uncovers at low water, lies one cable from the south shore of Elizabeth island, at one mile within the western entrance of Chismore passage.

Anchorage may be obtained, in mid-channel, in 7 to 10 fathoms, 2 cables distant from the south shore of Elliott island; with Genn islands seen midway between Elliott and Elizabeth islands, bearing N.N.W. ¾ W. Good holding ground and excellent shelter.

CHALMERS ANCHORAGE on the north-west side of Elliott island is formed at the junction of that island with Elizabeth island.

Anchorage may be found in 13 to 14 fathoms, at 2 cables from the north-west extreme of Elliott island; with that extreme seen in line with south extreme of White Cliff island, bearing N.N.E. ½ E.

White Cliff island, 260 feet high, situated nearly midway between Kennedy and Elliott islands, at 6 cables northward of the latter, is about half a mile long in a north and south direction; its south extreme terminating in high, bold, white cliffs. A ledge extends 2 cables southward from White Cliff island. There is a depth of 30 fathoms, mud and shell, at one cable southward of this ledge. Marble has been quarried at White Cliff island.

Cecil patch, seldom marked by kelp, has 4 fathoms upon it, and lies one mile West from the south extreme of White Cliff island. There are depths of 7 and 18 fathoms at 100 yards from the patch.

The summit of Kennedy island (Elizabeth peak), seen in line with the south extreme of White Cliff island, bearing E. by S., will lead northward of Cecil patch.

Genn islands consist of two small wooded islands, about 120 feet high, lying close together in an east and west direction. The eastern and smaller island lies 2½ miles N.W. ½ W. from the south extreme of White Cliff island.

Bribery island, small and wooded, lies 8 cables W. by S. from the western Genn island.*

Lawyer group consist of two principal islands, and several smaller ones, about one mile in extent, in a N.W. by W. and S.E. by E. direction. The eastern and smallest island of the group lies 5 cables W. by S. from Bribery island.

Cruice rock, of small extent, covers at three-quarters flood, and lies 2¼ cables W. ½ N. from the western Lawyer island.

Hunt point (of Vancouver) the north extreme of Porcher island is about 3 miles westward of Chismore passage. Temporary anchorage in off shore winds may be had under the point in about 10 fathoms.

MALACCA PASSAGE, situated between Porcher island and the Genn and Lawyer groups, is about 6 miles long, in a W. by N. and E. by S. direction, and about 1¾ miles wide, with depths of 21 to 81 fathoms, mud, the latter depth being found in the western portion of the channel.

Directions.—The summit of Kennedy island, Elizabeth peak (bare patches on north-west side), seen in line with the south extreme of White Cliff island, bearing E. by S., will lead through Malacca passage.

* Consists of "low rocks very little above high water."—Lieutenant E. L. Lang, R.N., H.M.S. *Mutine*, 1883.

SKEENA RIVER, the largest river on the coast of British Columbia, northward of Fraser river, takes its rise in lake Babine, near the village of Naas glee, about 200 miles beyond port Essington. At 120 miles from port Essington the river divides into three branches, known as the Forks of the Skeena, the principal branch taking a northerly direction, the others a north-west and south-east direction respectively. For about 20 miles above port Essington the Skeena river is available for vessels drawing 4 feet water; beyond that distance it is only navigable for canoes. The head of navigation, for vessels drawing over 6 feet, may be said to terminate 6 miles beyond port Essington, and 21 miles from the mouth of Skeena river.

The river is navigable for light-draught steamers as far as Mumford landing, 60 miles inland, and 200 miles further for canoes. There are two missionary stations on the river, and along its course are many spots favourable for settlements.*

At 6 miles below port Essington, the river divides into three channels called North, Middle and Telegraph passages.

These passages have not been examined in detail, and should be entered only under the guidance of a pilot.

The water, as far as port Essington, is stated to be of a light-blue colour, similar to that of Fraser river. The shores of the Skeena are said to be low, and covered with small hard wood and cotton trees; also good sized white oaks, similar to those found on the banks of the Fraser river. The shores at the entrance are densely wooded, chiefly cedar and hemlock, and bear evidence of a remarkably wet climate. The Skeena is stated to freeze over during the winter months at 6 miles below port Essington.

The entrance to the Skeena river is divided into 3 channels by Smith and Kennedy islands. They are designated North, Middle, and Telegraph channels or passages. North channel is suitable only for small craft. It is about 3 cables wide, with several sunken rocks, and only 2½ fathoms of water, and the current is very swift. Middle channel is obstructed by shifting sand banks, has irregular soundings in from 3 to 8 fathoms, and is in some places very narrow. Steamers coming from the north often take this channel in order to touch at port Essington. It is dangerous for sailing vessels, or without a pilot. Telegraph channel is the main passage with not less than 6 fathoms, water (in the channel) with a 2 or 3 knot current. The north channel of the Skeena river is blocked full of ice nearly all the winter but it seldom reaches down asfar as Kennedy island. Port Fleming is free from ice.

The head of tide water in Skeena inlet and where the river proper appears to commence is about 18 miles above port Essington. The

* *The West shore*, September, 1884.

river is navigable with difficulty for small stern-wheelers about 38 miles above tide water to Kitsumgallum, where there is a trail up the valley of the Kitsumgallum river, to the head waters of Nass river.

It is about 100 miles from tide water, with a rise of 725 feet to Skeena forks or Hazleton, a settlement not far from the abandoned fort Stager, erected in 1866 by the Western Union Telegraph Company Expedition near Kispaioks village.*

Minerals.—Kitsagatla, on the Skeena river, is reported to be an extensive coal country, the seams being cut through by the river, and from 3 to 35 feet thick. Gold is found in small quantities; plumbago is also found.

Supplies.—Potatoes of large size and good quality are plentiful; also berries, which are dried by the Indians for their winter food. The Skeena is a prolific salmon stream, and fish of the finest quality are procured here. Good timber is plentiful and of large size, especially spruce and yellow Alaska cedar.

Telegraph passage, the southern and principal channel of the Skeena river, is about 8 miles long, N.W. by N. and S.E. by S., with an average width of 1½ miles.

The western side of the channel is rendered dangerous by sand flats, some of which dry, extending from the eastern side of Kennedy island, but the eastern side has depths of 4½ to 17 fathoms.

Caution.—Unless under the guidance of a pilot, as the channels of the Skeena are subject to periodical changes, it is recommended, before attempting them, to buoy the channel by boats or other means.

Directions.†—The following general directions might assist to trace the Channel:—Keep midway between Kennedy and Marrack islands until the south extreme of Kennedy island (Seabreeze point) is seen just open of the south-east extreme of that island (Daring point) bearing S.W. ¾ W., and when distant 1¾ miles from the latter point, steer N.N.W. ½ W. 5½ miles, keeping on the eastern side of the channel, thence W. by N. for De Horsey island, when the eastern shore of that island should be kept on board for about 2½ miles. Thence steer N.E. ¼ E. for 5 miles, with the north extreme of De Horsey island astern, bearing S.W. ¼ W., which should bring a vessel to the anchorage off port Essington.

PORT ESSINGTON (Spŭk sūt) lies on the south shore of the Skeena river, about 11 miles from its mouth and 6 miles from De Horsey island, and affords extensive anchorage for vessels of any size. The

* Captain J. C. Brundige.

† From a running survey made in H.M.S. *Daring*, in 1878.

village is situated on the west side of a point forming the angle between the Skeena and Ecstall inlet. The latter is a long channel extending in a south-easterly direction from its junction with the Skeena. From this channel come the greater part of the ice-floes which encumber the Skeena in the cold season. Behind the flat on which the village stands is a ridge which rises in one place to a rather remarkable conical mountain. Strong N.E. gales in winter interrupt communication with the shore, and though not frozen over there is much loose ice, as also quantities of heavy drift-wood. Ships could not remain at port Essington during the months of December, January, February and March, and well into April. The snowfall has been about 6 feet on the level.

Three cannaries have been established in the vicinity of port Essington and a temporary church has been erected.

Anchorage with good holding ground will be found in mid-channel abreast port Essington, in 4 to 7 fathoms, mud.

A heavy cross-sea is caused by strong winds from N.W. to S.E., and vessels riding at anchor in the current during a gale of wind would be very liable to foul and trip their anchors.

Raspberry islands, situated* eastward of port Essington, consist of three wooded islets, lying close to the eastern shore.

De Horsey island lies about one mile northward of Kennedy island, leaving a passage between choked with sandbanks, and only available for boats.

Middle passage, situated between Kennedy and De Horsey islands, is obstructed at its western entrance by sand-flats, some of which uncover. It should not be attempted by a stranger.

North passage, between Tsimpsean peninsula and Smith and De Horsey islands, has a depth of about 3 fathoms in some parts, and is not recommended. Mount McGrath on Smith island is conspicuous, 2,200 feet high. At the entrance to this passage several dangers lie nearly in mid-channel; the navigable channel lies on the south shore, and is barely one cable wide in some parts.

Near the entrance of North Skeena passage there is a considerable mining camp called Willaclagh.

From Woodcock landing, on the north shore of North Skeena passage, a narrow inlet extends to the westward of north, cutting off Tree point from the mainland, sending a branch to join the sea, near Coast islet, the inlet

* So named by Vancouver, on account of the quantity of fine raspberries gathered there.

itself continuing north-westerly joins the large basin in which Oldfield island (containing mount Oldfield 2,300 feet high) is situated. This basin enters Malacca passage between Lima point and Coast islet, and connects with Metlah catlah bay through Venn creek at its north-west angle. The large mass of land west of Oldfield basin, E.S.E. from Metlah catlah, and of which Lima point appears to be the south-east entrance, has been named Digby island.*

Anchorage will be found at one mile within the passage, off Woodcock landing on the north shore, nearly in mid-channel, in 8 to 10 fathoms, but the anchorage is limited though it is more sheltered than port Essington. Vessels should moor.

Soundings.—The depths in the navigable channels of the Skeena, from the entrances to abreast port Essington, are from 4 to 20 fathoms.

Tides.—The night tides rise higher than those of the day. It is high water at full and change in port Essington at 1h. 0m.; springs rise 24 feet, neaps 15 feet. The flood stream at the entrance attains the velocity of 4, and the ebb 5 knots an hour at springs.

Winds.—During September easterly and S.E. winds, accompanied by almost continuous rain, with frequent squalls, have been experienced.†

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* Dominion Geological Survey, 1881.

† Commander Hanmer, R.N., H.M.S. *Daring*, 1877.

CHAPTER XI.

CHATHAM SOUND, EDYE AND BROWN PASSAGES, AND DIXON ENTRANCE.

VARIATION, 27° 10″ East in 1888.

CHATHAM SOUND,* is an extensive sheet of water about 38 miles long in a general N.W. by N. and S.E. by S. direction, and from 7 to 14 miles wide, lying between the Tsimpsean peninsula and Stephens and Dundas islands, the north-western portion of the sound washing the southern shores of Alaska.

In the middle of the southern portion are two groups of islands (Rachel and Lucy islands), together with other detached islets and rocks, especially on the north shore.

At the northern end of Chatham sound, nearly abreast port Simpson, there are some clusters of low rocky islets (Connis and Pointers rocks), which render that portion of the sound dangerous to navigation under certain conditions, and divide the sound into two navigable channels (Main and Oriflamme passages).

Chatham sound communicates with Hecate strait by three channels, Edye passage, in the south-west corner of the sound, being the channel usually taken (*see* page 429). Brown passage, south of Dundas islands, though comparatively wide, has strong and irregular tides near its western end; and a patch of rocks awash at high water lies nearly in mid-channel.

Dixon entrance, the principal channel north of Dundas islands, is about 5 miles wide, and is the channel usually taken by vessels proceeding northward along the coast of Alaska.

Landmarks.—On the north shore, in the south-eastern portion of Chatham sound, mount Oldfield and mount McGrath, 2,300 and 2,220 feet high respectively, are conspicuous.

With the exception of a cluster of bare rocks (Gull rocks) off the mouth of Edye passage, the islets in that portion of the sound are wooded, and of a conspicuous dark colour.

* *See* Admiralty plan :—Brown and Edye passages, No. 2,453; scale, m = 1 inch; also Admiralty chart :—Cape Caution to port Simpson, northern portion, No. 1,923a; scale, m = 0·25 of an inch.

On the South Dundas island, there are four conspicuous peaks, the eastern and highest of which is 1,400 feet high. Northward of Metlah catlah, Mission mountain, and Deer mound, of rounded form, will be seen rising from comparatively low land to the height of 1,310 and 2,230 feet respectively.

At 2 miles southward of port Simpson, mount Griffin (Waverly peak), a mountain of triangular shape with a sharp summit, rises to 1,410 feet. South-east of mount Griffin, the ridge has several conspicuous peaks rising to nearly 3,000 feet, amongst which are Leading peak and Basil Lump 2,200 and 2,960 feet high respectively.

Mount McNeil, on the north side of Work channel, has a snow-clad summit, of conical shape, 4,300 feet high.

On the south shore of the sound (Coast mound) a conspicuous hill of oval shape, 750 feet high, will be seen on Middle Dundas island, with a chain of wooded islets, of a peculiarly dark colour, fringing the shore.

Near the north-east extreme of North Dundas island, Table hill with a flat summit rises to the height of 700 feet, and is conspicuous. Southward of Table hill, Thumb peak rises to the height of 2,500 feet. With the exception of one small islet (Grassy islet), the islets and rocks in the northern portion of Chatham sound are bare and conspicuous.

Dangers.—The southern portion of Chatham sound is comparatively free from danger, the rocky clusters being of considerable elevation above high water and moderately steep-to. Northward of Metlah catlah bay, however, ledges which uncover at low water extend in many places to the distance of 2 miles from the eastern shore. On the western side of the sound also, there are several off-lying detached sunken rocks, with deep water close to them. Abreast port Simpson, two clusters of rocks lie in the fairway of the sound; and being but little elevated above high water, render that portion of the sound dangerous by night or in thick weather.

Caution.—Northward of Metlah catlah bay, during a fog, or if uncertain of the position, the eastern shores of Chatham sound should not be approached under 70 fathoms; nor the western shores under 40 fathoms.

Soundings.—The general depths in the southern portion of Chatham sound are from 10 to 66 fathoms, the former depth being obtained upon Alexandra bank nearly in the middle of the sound, northward of Rachel islands. Northward of Metlah catlah bay the water deepens. The deep water commences near the south extreme of South Dundas island, and extends towards the mouth of Big bay, skirting the dangerous ledges which front the eastern shores of the sound. The depths in this portion of the

sound are from 54 to 105 fathoms, mud at the latter, and rocky bottom at the former depth. From abreast of Big bay, the deep water extends towards the north extreme of North Dundas island, and widens in extent, occupying nearly the whole of the northern portion of the sound, with depths from 58 to 214 fathoms, mud bottom, with occasional patches of rock.

Anchorages.—Anchorage will be found off the north entrance of Skeena river (p. 401), in Metlah catlah bay (p. 415), Duncan bay (p. 416), Big bay (p. 418), Pearl harbour (p. 419), and port Simpson (p. 423), on the eastern side of Chatham sound. Also in Refuge bay at mouth of Edye passage (p. 431), and in Qlawdzeet, north end of Stephen island (p. 433), on the western side of the sound.

Gull rocks consist of three principal bare rocks, about half a mile in extent, the highest rock being about 30 feet above high water, lying off the north entrance of Edye passage, 3 miles W. by N., from the north-west extreme of Porcher island (Hunt point), and 3½ miles from the nearest portion of Prescott island.

Ettrick rock, a dangerous patch of small extent, which uncovers 3 feet at low water, lies 1½ miles S.E. by E. from the centre of the Gull rocks.

Havelock rock, of small extent and uncovering 6 feet at low water, lies 2½ miles S.E. by E. from the centre of Gull rocks, and one mile S.W. ½ W. from Hunt point. Both Ettrick and Havelock rocks have deep water close to.

Holland island, small, wooded, and 10 feet high, lies 1¾ miles E. by N. ¾ N. from Green Top islet.

Kitson island, situated off the mouth of North Skeena passage, is about 2 cables in extent, and lies 1½ miles N.E. ½ E. from Holland island.

Green Top island, 15 feet high, is small, with a patch of shrub on its summit, and lies 4¼ miles N.W. by W. ¼ W. from the western island of the Lawyer group.

Kinnahan islands, two in number, and about half a mile long, lie close together in a N.W. and S.E. direction, about one mile from the shore of Tsimpsean peninsula; they are wooded, about 200 feet high. The south extreme of South Kinnahan islands lies 1¼ miles N.N.W. from Green Top island.

Rachel islands (Lak ōh witz), two in number, about one mile in extent, in a N.W. and S.E. direction, wooded and about 200 feet high, lie nearly midway between Tsimpsean peninsula and Stephen island. The south-eastern extreme of the south-east Rachel island lies 3¾ miles N.W. from the northernmost Gull rock; and 5¼ miles S.W. by W. ½ W. from the south extreme of South Kinnahan island.

Alexandra patch is nearly circular, one mile in diameter, within the depth of 20 fathoms. This bank has depths of 10 to 17 fathoms, over a bottom of mud and sand.

The eastern edge of Alexandra patch lies one mile North of the north Rachel island. There are depths of 46 and 50 fathoms, mud, at 5 cables eastward and northward of Alexandra patch.

Lucy islands, a group of islands and high-water rocks, the large islands being wooded and the small bare, lie nearly in the middle of the sound abreast Metlah catlah bay, and are about one mile in extent in an east and west direction. The summit of the eastern and largest island is 200 feet high, and lies 5¼ miles N.W. from the north extreme of the north Rachel island, and 3¾ miles S.W. ¼ S. from the south extreme of Tugwell island. This group is of great use when making Metlah catlah during thick weather, as being comparatively free from danger it may be approached (except on the south side), and, when made, the easternmost island of the group kept astern bearing S.W. ½ W. will lead to the entrance of Metlah catlah bay.

A ledge of rocks, 1¼ miles in length in a north-west and south-east direction, which partially uncover, extends from 4 to 9 cables to the southward and to the south-westward of the Lucy group; the outer rock lying 9 cables South from the summit of the eastern island of the group. The north-western rock dries 3 feet and lies 2½ cables S.W. ½ W., from the nearest island of the group, and is marked by kelp.

TSIMPSEAN PENINSULA separates Skeena river from Work channel, being barely half a mile wide abreast the mouth of Skip river. This peninsula (which takes its name from a tribe of Indians residing upon it) is nearly 32 miles long, in a general north-west and south-east direction, with a greatest breadth of 9 miles.

The head-quarters of the tribe of Indians inhabiting this peninsula are at Metlah catlah and port Simpson.

METLAH CATLAH BAY* is formed between the shore of the Tsimpsean peninsula and the north-west coast of Digby island, and

* *See* Admiralty plan:—Metlah catlah bay, No. 364; scale, *m* = 3 inches.

is protected from the westward by Tugwell island and the reefs which join that island to the shore of the peninsula. The bay from its entrance takes a general northerly direction for one mile, gradually narrowing as the settlement is approached; it then turns sharply to the east and south-east, the latter part being known as Venn creek.

Metlah catlah village, an Indian settlement, founded as a missionary station, is situated upon Mission point. The houses forming the mission are built upon an elevated bank, about 100 feet above high-water mark, and are mostly whitewashed; the whole settlement from the offing presenting the appearance of a picturesque English village. The most conspicuous buildings being the church, school-house, and mission house.

The young natives, most of whom spoke English, were taught trades, and for this purpose there were carpenter's and blacksmith's shops, saw mills, and a soap factory. The women were taught sewing and other useful employment. Patches of ground are cultivated, and potatoes of large size and good quality grown.

Population.—It is difficult to ascertain correctly the population of any Indian settlement; detached parties are so often away hunting and fishing.

Tugwell island lies about 2 miles south-westward of Metlah catlah village, and vessels desirous of communicating with that place usually anchor off the eastern side of the island, or off its northern side in Duncan bay, according to circumstances. Tugwell island is about 1¼ miles long, in a north and south direction, with an average breadth of half a mile, and is fringed by dangerous rocky ground, marked by kelp, especially on its south-eastern side. It is wooded (the tops of the trees being about 200 feet high), and is connected at low water with Mission point upon which Metlah catlah village stands.

Dawes rock, awash at low water, lies 4 cables S.S.W. ½ W. from the south extreme of Tugwell island (Dawes point). Between Dawes rock and Dawes point, large boulder rocks uncover at low water, and extend along the western side of Tugwell island, generally marked by kelp.

Enfield rock has 5 fathoms water upon it, and lies one mile S.S.W. ½ W. from the south extreme of Tugwell island, with foul ground between.

Caution.—Vessels should pass westward of Enfield rock, in not less than 10 fathoms, at low water.

Leading marks.—To enter, Knight island kept midway between Shrub and Pike islands bearing N.N.E. ¼ E., leads safely in to the bay,

between Tugwell island and Alford reefs, in 25 fathoms. *See* View on plan No. 364.

Carr islet, just shut in with the western extreme of Devastation island bearing N. by E. northerly, will lead eastward of the foul ground off the south-eastern part of Tugwell island. The south extreme of the large Cridge island seen in line with Quartermaster rock, and touching the north extreme of the small Cridge island bearing E. by N., will lead southward of the dangers off Tugwell island. *See* Directions, page 416.

Alford reefs are a dangerous cluster of rocks, about 3 cables in extent north and south, lying at the entrance of Metlah catlah bay. The northern rock, which uncovers 2 feet at low water, lies 6 cables N.W. by W. from Quartermaster rock.

The south extreme of the large Cridge island, in line with Quartermaster rock, bearing E. by N., will lead southward of the Alford reefs; Carr islet just shut in with western side of Devastation island bearing N. by E. northerly, will lead westward; the summit of Knight island kept midway between Pike and Shrub islands, bearing N.N.E. ¼ E., will also lead westward; and the flagstaff on Mission point (Metlah catlah village) in line with the western extreme of Pike island bearing N. by E., will lead eastward of Alford reefs.

Quartermaster rock, a small black rock, 2 feet above high water, lies 4 cables W. by S. from the south extreme of the large Cridge island, and 1½ cables from the small Cridge island, on the same bearing.

A rock, which uncovers one foot at low water, lies 1½ cables South from Quartermaster rock.

Cridge islands, two in number, lie at the south-east entrance of Metlah catlah bay: the eastern and larger island is 150 feet high, and lies 2 cables from the eastern shore of the bay (Digby islands). The western island is small, 100 feet high, and lies 2 cables W. by S. from the south extreme of the larger Cridge island. Both islands are wooded.

Midge rock, a patch of small extent, which uncovers at low water, lies half a mile North from Quartermaster rock; and about 4½ cables north-eastward from nearest part of Alford reefs.

Devastation island lies almost in the centre of the bay half a mile eastward of Tugwell island, and is nearly one-third of a mile long, north and south, and 200 yards broad. The island is wooded, 150 feet high, and two rocky islets lie close to its south extreme.

The western shore of Devastation island has no danger off it beyond the distance of half a cable; but from the northern extreme of this island, a shoal, portions of which uncover at low water, extends half a mile in a north-easterly direction towards Pike island.

Knight island, barely 10 feet high, small, with stunted scrub upon it, lies 4 cables E. ¾ S. from the north extreme of Devastation island.

Armour rock, with 9 feet water over it, lies S.E. by S., distant one cable from Knight island.

Pike island, 100 feet high and wooded, is about one-third of a mile long in a north and south direction, and its south extreme lies 7 cables E.N.E. from north end of Devastation island.

Carr islet, small, about 60 feet high, lies half a mile N. by E. from the north extreme of Devastation island. A small islet lies 2 cables N.W. from Carr islet. Carr islet is connected at low water with the spit which joins Tugwell island and Observation point.

Shrub islet lies 1½ cables W.N.W. from the north side of Pike island, and is of small extent, low, and easily recognizable from its having three peculiar trees on it, the only ones on the island.*

Pike, Carr, and Shrub islands are not easily distinguished by a stranger making for Metlah catlah; and Carr islet appears as part of Devastation island.

A shoal, the outer portion of which uncovers at low water, extends nearly 2 cables from the north side of Shrub islet, and is the outer portion of a bank of sand with patches of rock upon it, which connects Pike island Shrub islet, Gribbell and Isabel islands at low water.

A ledge of rocks, which uncovers at low water, extends 1½ cables south-east from Observation point.

Kelp rock, a dangerous sunken rock, lies nearly midway between Shrub islet and Observation point, 2 cables from either. The navigable channel between Shrub islet and Observation point, is contracted by Kelp rock to barely half a cable in width at low water.

A small iron buoy is moored on Kelp rock; but this buoy is often washed away, and therefore its being in position cannot be depended on.

Mission point lies three-quarters of a mile N.E. by E. ½ E. from Observation point.

Gribbell island, situated on the south side of the channel leading into Venn creek, is about the same size as Shrub islet, from which it is distant 5 cables in a north-easterly direction. A small rocky islet lies about half a cable off the north side of Gribbell island.

* These have been trimmed and appear as a pyramid supported by a column.—H. G. Hatch, Navigating Lieutenant, H.M.S. *Heroine*, 1883.

A cask painted black is moored off the north-west point of Shrub islet.—Navigating Lieutenant F. Roberts, H.M.S. *Satellite*, 1884.

Isabel island lies 1½ cables N.N.E. from the summit of Gribbell island, and 1¾ cables South from Mission point.

A dangerous sunken rock lies half a cable westward of Isabel island, and reduces the navigable channel at low water to barely 60 yards in width.

Venn creek takes an E. by S. direction from Mission point, but is only suitable for small vessels. There are several fishing stations upon the shores of this creek, in which the Indians obtain salmon. Venn creek at its head connects with the unexplored Oldfield basin, east of Digby island, which extends southwards and eastward, connecting with Malacca and North Skeena passages.

Anchorage will be found in 11 to 12 fathoms, mud bottom, 3 cables off the western side of Devastation island, with the south extreme of Devastation island seen in line with the smaller Cridge island, bearing S. E. by S. and the south extreme of Carr islet seen in line with the flagstaff on Mission point, bearing N.E. ¼ N. Small vessels occasionally proceed into Venn creek and anchor off Metlah catlah village, in 10 to 12 fathoms, with the flagstaff on Mission point bearing W. by S. distant 3 to 4 cables.

The channel into this anchorage is barely 60 yards wide at low water, when the dangers on either side indicate themselves, but the passage should only be attempted by short vessels, of light draught; and at all times it would be well to place boats upon the outer edge of the shoal off Shrub islet, and also upon the rock which lies westward of Isabel island, and likewise on Kelp rock, should the buoy marking that danger be not in position.

Auriol point, just open north of Shrub islet bearing N.E. ½ E., leads between the foul ground southward of Carr island and the ledge extending from the north extreme of Devastation island, and when Ryan point comes open east of Carr island bearing N.W. ½ N. a course may be steered to round the boat moored upon the outer edge of the shoal off Shrub islet.*

* The best time for entering Venn creek for a ship of moderate draught is at half tide, or between that and low water. Bring the north point of Pike island in line with the north extreme of peak of mountain on Digby island, bearing E.N.E.; keep this mark on until the prison (a square built tower with a flagstaff on it) bears N.N.E. ¾ E., when it will be seen between two houses; steer for it on this bearing until nearly up to Shrub islet, when skirt closely round the rocks of that island, there being 4 to 5 fathoms close to them, then a mid-channel course. When nearing Isabel island keep the kelp, which will point out the position of the rocks, on both bows, and keep in the centre. When past Isabel island anchor or moor according to the vessel's draught, but the latter is preferable. When the *Cormorant* went in the rock inshore off Shrub rocks, and the inshore one off Isabel island were buoyed.—Navigating Lieut. Geo. A. Courtenay Webb, R.N., H.M.S. *Cormorant*, November 1886.

For all ordinary purposes, however, the anchorage off Devastation island is within easy distance for communicating by boat with Metlah catlah mission.

DUNCAN BAY, on the north-side of Tugwell island, affords anchorage when desirous of communicating with Metlah catlah during the prevalence of south-easterly winds.

The entrance to this bay between the north extreme of Tugwell island and Ryan point is about 1¾ miles wide, and takes an easterly direction for about 1½ miles, terminating in the sandspit which connects Tugwell island and Tsimpsean peninsula (Observation point) at low water.

Dangers.—A shoal with 3 fathoms (and probably less) water upon it, extends half a mile northward of Tugwell island. Ledges, which uncover, and sunken rocks, extend nearly 7 cables from the north shore of Duncan bay.

Hecate rock, with only 10 feet water on it, lies near the head of Duncan bay, 3 cables from the north shore and half a mile W. by N. ½ N. Observation point.

Directions.—If desirous of anchoring in Duncan bay, pass one mile north-westward of Tugwell island, and when the south extreme of Gribbell island is seen just open of Observation point, bearing E. ¼ S., that mark should be steered for; a berth should be taken up on that bearing, in 8 to 10 fathoms, mud, with Chapman point, the north-west extreme of Tugwell island, bearing S.W. by W.

Approaching Metlah catlah from the south-eastward, if the Lawyer group of islands be kept in line with Green Top island bearing S.E. by E. ½ E., that mark astern will lead directly to the entrance of Metlah catlah bay; and having brought Carr islet in line with the western side of Devastation island bearing N. by E. northerly, a vessel may steer in on that mark, and proceed as before directed to the anchorage off the north-west side of Devastation island. Or if bound into Duncan bay, pass one mile westward of Tugwell island, and proceed as before directed. During a fog or in thick weather, when approaching Metlah catlah from the south-eastward, do not shoal to less than 40 fathoms, and on such occasions the Lucy islands should be cautiously steered for and sighted, taking care to avoid the reefs which extend from the south and south-west side of the group. The large or eastern Lucy island should be brought to bear S.W. ¾ W. astern, and a N.E. ¾ E. course should take a vessel to the entrance of Metlah catlah bay. The bank of 10 fathoms (and less water) extends nearly one mile to the southward of Tugwell island, and the hand lead, if proceeding slowly, should indicate the position. During summer and autumn large quantities of kelp mark this bank.

Tides.—It is high water, full and change, at Metlah catlah at noon; springs rise 21 feet, neaps 17 feet.

TREE BLUFF, the south entrance point of Big bay, lies 5 miles N.N.W. ½ W. from Ryan point, the north entrance point of Duncan bay. The shore northward of Ryan point is low and wooded to the distance of 3 miles back from the coast, where it rises into high land; the two most conspicuous mountains being Mission mountain and Deer mound. Two streams enter the sound on this part of the coast, and there are two islets lying close to the shore, respectively one and 2 miles northward of Ryan point. The former (Swamp islet) is covered with low grass, and lies about 5 cables distant from the shore. The latter islet is bare (Slippery rock), about 4 cables from the shore.

Immediately southward of Tree bluff there is a wooded hill, close to the shore, 250 feet high.

Tree Bluff is situated in latitude 54° 26′ 0″ N., longitude 130° 29′ 0″ W.

Dangers.—Between Metlah catlah and Big bays, dangerous ledges extend off shore in many places to the distance of 2 miles. These ledges uncover at low water, and are steep-to.

Hodgson reefs, a dangerous cluster, lie northward of Duncan bay; their south part covers at half flood, and lies 2 miles N.W. from the north-west extreme of Tugwell island, and 1¾ miles W. ¾ S. from Ryan point. From that position, dangerous sunken rocks extend in a N.N.W. direction for 2 miles.

Abreast Tree bluff the edge of the bank, which dries at low water, lies 1¼ miles from the shore.

Leading marks.—The south side of Kinnahan islands, just showing clear of the south end of Tugwell island bearing S.E. ¾ E., leads westward of Hodgson reefs; and the eastern island of the Lucy group should not be brought to bear south of S. by E. (astern) until mount Griffin (over port Simpson) is seen in line with the north end of Burntcliff island N. by E. ½ E.; this mark leads westward of all dangers off the entrance to Big bay.

BIG BAY* **(Lak hou),** the entrance to which between Tree bluff and South island is 2½ miles wide, takes an easterly direction for 3½ miles. At its head, which is skirted by a sand flat, which dries one mile from the shore at low water, several streams flow into the bay; this part being known as Salmon river bight.

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* *See* plan:—Big bay, on Admiralty chart No. 2,426; scale, *m* = 3 inches.

South island, situated at the north-west entrance of Big bay, is small and wooded, with a sharp summit, 150 feet high, and connected with the mainland by a space of foul ground, dry at low water, and one mile in width.

A ledge of sunken rocks, with depths of 6 and 12 feet, extends 5 cables S. ½ W. from the south side of South island.

Haycock island lies 3 cables East from the summit of South island.

White Cliff island lies 9 cables E. ½ S. from Haycock island; it is small, and terminates in high, white, conspicuous cliffs.

Shattock point, 3 cables E.N.E. from White Cliff island, is the north-west entrance point of Salmon river bight.

Swallow island lies one mile E. ¾ S. from White Cliff island, and one cable from the north shore.

Curlew rock is small, about 2 feet above high water, and lies 5 cables South from Swallow island.

Ripple bank at the entrance to Big bay, is about 2 cables in extent in an East and West direction; the shoalest spot near the eastern end, having 12 feet water over it, sandy bottom, lies $1\frac{1}{10}$ miles S. by W. ¾ W. from the summit of South island. This bank usually indicates itself by a tide rip, but no kelp was growing upon it in the autumn of 1868.

A sandbank, about one cable in extent, with 3 fathoms water, lies S. ½ E., 3 cables from Haycock island.

Escape reefs are a dangerous cluster at the entrance to Big bay, E.S.E. of Ripple bank. The outer or western reef has 4 feet water over it, and lies $1\frac{4}{10}$ miles S. ¾ W. from the summit of South island. The eastern reef has 5 feet water over it, and lies half a mile E.N.E. from the western one. There are depths of 16 and 17 fathoms between these reefs. During the season of kelp growth, that weed is found in great quantities upon Escape reefs, and near the head of Big bay.*

Anchorage will be found in Big bay, in 11 and 12 fathoms, mud, with Haycock island in line with the north extreme of South island bearing N.W. by W. ¾ W.; and White Cliff island in line with mount Griffin bearing N. by W. ½ W.

* Both reefs have small lumps dry at low water.

Directions.—Approaching Big bay from the southward, mount Griffin should be kept in line with the north extreme of Burnt-cliff island N. by E. ½ E. until Sharp peak on the ridge south-east of mount Griffin is in line with the south end of Swallow island bearing E. by N.; the latter mark will lead directly into Big bay; anchor with Sharp peak open south of Swallow island, in the position and depth above given.

Burnt-cliff island, situated northward of South island, is about half a mile long in a N.W. ½ N. and S.E. ½ S. direction, and wooded, its highest point near its north end being 200 feet high. The north extreme of this island terminates in high red-brown cliffs: the north-east extreme is cultivated, and from that point a long bank of shingle, awash at high water, extends 3 cables in a north-easterly direction. The whole space inshore of South and Burnt-cliff islands, uncovers at low water.

A ledge, which uncovers at low water, extends 3 cables in a north-westerly direction from the north-west extreme of Burnt-cliff island. The channel between Burnt-cliff and One Tree islands is available only for boats.

One Tree island, situated 4 cables north-west of Burnt-cliff island, is of small extent, with a sharp wooded summit 150 feet high. A low grassy point extends 100 yards in a northerly direction from the north extreme of One Tree island, at the extremity of which a high, conspicuous, solitary tree was standing in 1868. One Tree island forms the southern point of entrance to Cunningham passage, and the western shelter of Pearl harbour.

A ledge, which uncovers at low water, surrounds One Tree island; its greatest distance from the shore being 2½ cables in a N.N.W. ½ W. direction from the single tree.

Flat top islands, a group lying to the northward of One Tree island, consists of three wooded islands, lying N.N.E. and S.S.W. of each other. The middle and longest island of the group is connected by a narrow grassy neck with the northern island, and the latter has a flat summit, covered in July with long grass; also a single stunted tree growing upon it (1868). The southernmost and smallest Flat-top island lies 3½ cables N. by E. from the tree on One Tree island.

Ledges, which uncover at low water, and foul ground, surround the Flat-top group to the distance of 1½ cables.

FINLAYSON ISLAND, the largest in this locality, is 2¾ miles long in a N.W. ½ N. and S.E. ½ S. direction, and one mile broad, 200 feet high, and wooded. The south extreme of the island terminates in cliffs;

but the north extreme (Gordon point) is long and comparatively low, with ledges which uncover extending 2 cables to the northward; and on the north-west side of the island, about half a mile from the north-west extreme, is a large stream.

Red Cliff point, situated on the eastern side of Cunningham passage, half a mile N.E. from Fortune point, is rendered conspicuous by the high red-brown cliffs over it, and the small islet close to. Immediately south-east of the point there is a bay, with a sandy beach, and stream at its head.

PEARL HARBOUR,* situated eastward of One Tree island, is nearly circular in shape, and half a mile across, its eastern side being formed by a bay, which dries nearly throughout at low water. On its south-east side, the high bank of shingle which extends from the north-east point of Burnt-cliff island, effectually shelters the harbour from south-easterly winds.

Anchorage.—Good anchorage will be found in 9 to 10 fathoms, mud bottom, near the middle of Pearl harbour, with Fortune point seen just open northward of the southernmost island of Flat-top group, bearing N.W. ¼ N., and the tree on One Tree island, W.S.W., distant 3 cables.

Otter anchorage, situated at the south end of Cunningham passage near the eastern shore, northward of Flap-top islands, is useful if communicating with the wood-cutting establishment abreast it.

Anchorage in 15 to 17 fathoms, sand, will be found with the centre of the wood-cutting establishment in line with Leading peak, bearing E. by N. ¼ N., and the northernmost Flat-top island (Green mound) S. by E., distant 1½ cables.

Wood-cutting establishment, from which the principal supplies for port Simpson are obtained, is situated near the middle of a sandy bay, the northern point of the bay terminating in cliffs. The bay dries nearly throughout at low water.

From Otter anchorage there is a passage eastward of Flat-top islands into Pearl harbour, but this is not recommended to a stranger.

Sparrowhawk rock, a dangerous, sunken, pinnacle rock, on which is only 5 feet water, lies nearly half a mile N.W. ¼ N. from the tree on One Tree island, and nearly in mid-channel, between One Tree and Finlayson islands; it is steep-to, there being depths of 10 and 12 fathoms at a distance of 50 feet from it.

Leading peak, a well defined peak of triangular shape (the first to the south-east on the ridge from mount Griffin), in line with the north extreme

* *See* Admiralty plan:— Pearl harbour, on sheet No. 2,426.

of Green mound, the northernmost islet of the Flat-top group, bearing E. by N. ½ N., or that peak seen just open southward of the wood-cutting establishment abreast Otter anchorage, E. by N. ¼ N., will lead northward of Sparrowhawk rock.

Dodd rock is the most outlying danger extending from the south side of Finlayson island, and lies a little over 2 cables South from Fortune point; ledges which dry, connect it with that point. Dodd rock only covers at the highest equinoctial tides, and is therefore a useful mark when entering Cunningham passage, as there is deep water a short distance southward of the rock.

Leading peak seen just open southward of the wood-cutting establishment abreast Otter anchorage, bearing E. by N. ¼ N., will lead southward of the Dodd rock.

Directions.—Approaching Cunningham passage, Red Cliff point should be steered for in line with Fortune point, bearing N.E., until Leading peak is seen in line with the north Flat top island (Green mound), bearing E. by N. ½ N., when the latter mark should be steered for. When the southern side of Burnt-cliff island is seen open northward of the tree on One Tree islet, bearing S.S.E. ½ E., a vessel will be eastward of Sparrowhawk rock; and if bound to port Simpson, may haul to the northward into Cunningham passage.

If bound into Pearl harbour, a mid-channel course from the above-mentioned position should be shaped between One Tree islet and the southernmost Flat top island. Belletti and Shattock points, two conspicuous wooded points on the eastern shore, should be kept in line, bearing S.E. by E., when entering Pearl harbour.

CUNNINGHAM PASSAGE, eastward of Finlayson island, between it and the Tsimpsean peninsula, lies in a N. by W. ½ W., and S. by E. ½ E. direction. The southern portion of this channel is barely 3½ cables wide; but northward of Sarah point (the north-east extreme of Finlayson island) the passage widens, attaining, between One Tree islet and Gordon point, a width of 1¼ miles. The depths in mid-channel are from 16 to 36 fathoms, with no danger beyond one cable from the shore, until nearing Village island.

Village island, situated at the south-west entrance of port Simpson, at about one cable from the shore, with which it is connected at half tide, is about a quarter of a mile long in a W.N.W. and E.S.E. direction; its south side forms a bay; and following the trend of that bay and round the southern extreme of the island, the houses of one of the Tsimpsean

Indian villages will be seen. Village island near its north-west extreme is about 50 feet high, having on it a high pole.

One Tree islet is covered with stunted trees about 100 yards long east and west, lying close to the north-west extreme of Village island. Near the western end stands a conspicuous decayed tree from which the name of the islet is given.

Birnie island lies at the north-west entrance of port Simpson, and is three-quarters of a mile long in a north and south direction, and a little over 2 cables broad, its greatest elevation 330 feet being near the middle of the island. The shores of this island are comparatively bold and unbroken. Knox point, the south extreme of Birnie island, lies 1¼ miles North from Finlayson island, and 1¾ miles N.W. ¾ W. from One Tree islet. Ledges which uncover at low water extend one cable from Knox point.

PORT SIMPSON,* the most spacious harbour on this part of the coast, is nearly 1½ miles wide at its entrance between One Tree islet and Birnie island; thence it takes an easterly direction for about 3½ miles, contracting gradually as the head is approached, and terminating in a narrow bight, named Stumaun bay, which dries across at low water. At its head are several streams, where salmon, from which it derives its name, are caught. The northern shore of the port is fringed with a rocky beach, compact and backed by rapidly rising high land. The southern shore is not so regular, nor so steep-to, the rocks which dry at low water, near the eastern part of the bay, extending from high-water mark in some places for the distance of nearly a third of a mile.

Port Simpson embraces over 4 square miles of water, from 4 to 20 fathoms deep with muddy bottom, good holding ground and free from rocks and shoals. It is easy of access from the sea, having no strong tidal currents, and well sheltered from all winds except the west, which here seldom blows. The prevailing winds are south-west and north-west, from which the harbour is perfectly protected.

Landmarks.—The villages on Village island, the decayed tree on One Tree islet, fort Simpson, and mount Griffin, with its triangular summit, are all conspicuous objects at the south-west entrance of port Simpson. On the north shore, George and Lizzie hills, two hills of nearly the same height, 870 feet, are wooded and easily recognised. The mouth of a lagoon, on that shore, is also conspicuous. Ben hill, over

* *See* Admiralty plan:—Port Simpson, on sheet No. 2,426; scale, *m* = 3 inches.

the south entrance point of Stumaun bay, is wooded, 130 feet high, and conspicuous amid the adjacent low land.

Soundings.—The greatest depth in port Simpson is 29 fathoms; but the average depths near the anchorage ground are from 12 to 18 fathoms, mud bottom.

Fort Simpson* was formed by the Hudson Bay Company in 1831 as a trading post, on account of the good anchorage found in its vicinity and the facilities afforded to sailing vessels. The trading post or fort stands near the south-west entrance point of the bay, close to the beach, and consists of a stockade of oblong shape, 250 feet long and 100 feet deep, with high bastions. The ground timbers were originally of pine, but are now of Cedar wood, a sleeper of the latter timber having been found to be quite sound 20 years after it was laid down, when all the pine wood sleepers laid at the same time were found to be rotten. The fort when seen from seaward presents a strong and compact appearance, and upon inspection its palisades will be found to be scarred by bullet marks, bearing evidence of the many sieges it has sustained from the natives. A large entry gate faces the beach with a landing jetty of stones in front of it. Within the fort are five large buildings, forming the dwellings of the Hudson Bay Company's officers, the trading stores, and a store for furs awaiting shipment. The fort stands near the beach, and flanking it and extending back some 300 feet, is a paled space of about 6 acres in extent. The eastern portion of this space is a well cultivated garden, and excellent potatoes, lettuces and radishes are grown, the first of the season of the latter appearing in 1868, on the 20th June. Raspberries and strawberries grow in abundance, the former being of large size and good flavour.

The village contains a population of about 800 Indians.

Good wood ready cut for steaming purposes may be obtained at $3 a cord.

The land at the back of the fort is about 130 feet high, and has been cleared to the distance of about one mile. The surface, however, is covered with thick moss, saturated with moisture, which renders walking unpleasant and difficult.

The rocks are stratified, mica schists passing into gneiss and granite, containing garnets, pyret and quartz veins. Gold has been reported to exist in the vicinity, but this requires confirmation.

The Hudson Bay Company's trading steam-vessel calls periodically at port Simpson, bringing supplies and returning with the furs. There

* For climate *see* page 4.

is a good pier with a depth of over 4 fathoms alongside it at low water.

The principal furs obtained are:—Sea otter, land otter, bear, beaver, lynx, silver fox, red fox, fisher, wolf, fur seal, hair seal, wolverene, racoon, musk rat, mink, marten, and ermine.

Temperature.—From observations taken in 1868, during the four months mentioned, the maximum and minimum registrations of temperature were as follows:—June, 65°, 50°; July, 74°, 48°; August, 70°, 54°; September, 64°, 44°.

Anchorage.—The usual anchorage is off the fort, in about 10 fathoms, mud bottom; a good berth being with Parkin island, seen just open northward of Birnie island, bearing N.W. (westerly), and (Gordon point) the north-west extreme of Finlayson island, in line with the decayed tree on One Tree islet, W.S.W.

Hankin reefs are a dangerous cluster of reefs which partially uncover, situated south-west of Village island (Cunningham passage). The south-west extreme of these reefs uncovers 6 feet at low water, and lies a little over 3 cables S.W. by S. from the north-west extreme of Village island. There is deep water between these reefs and Village island.

Fortune point, the south-east extreme of Finlayson island, just shut in with Sarah point, the north-east extreme of that island, bearing S. by E. ¼ E., leads westward; and the mouth of the lagoon on the north shore of port Simpson, seen open of One Tree islet, bearing N.E., leads northward of Hankin reefs.

Harbour reefs are an extensive plateau of rocks, awash at high water, forming a natural breakwater at the entrance to port Simpson, protecting the anchorage from N.W. winds. This sunken plateau is nearly square in shape, and about one mile in extent, within the depth of 5 fathoms. The south-east portion of these reefs only covers at the highest tides, and lies 2½ cables W.N.W. from One Tree islet.

The mouth of the lagoon on the north shore of port Simpson, seen just open westward of One Tree islet, bearing N.E., leads south-eastward; Lizzie hill seen well open southward of Birnie island, bearing N.E., leads north-westward; Ben hill open north of Bath point (south-east shore of port Simpson) bearing E. by S., leads northward; and Parkin island seen open of the north extreme of Birnie island, bearing N.W. (westerly) leads north-eastward of Harbour reefs.

Dodd passage lies between One Tree islet and Harbour reefs, and is 2 cables wide, with depths of 6 and 8 fathoms in it. This is available for steam vessels, but local knowledge is necessary.

Anchorage patch, with 18 feet water, sandy bottom, lies in the western portion of the anchorage ground off fort Simpson, with the fort gate bearing S.E. ¼ E., and the pole on the north-west extreme of Village island, S.W., distant 1¼ cables.

Choked passage, situated northward of Birnie island, has several ledges which uncover, and sunken dangers with deep water between them. This passage should not be attempted except in boats, and when using it keep near the north shore.

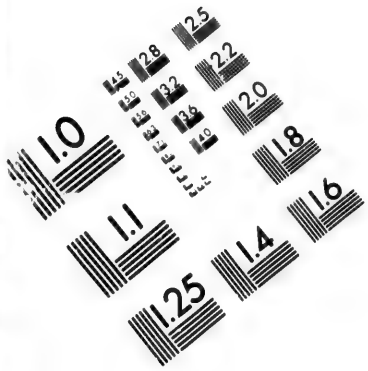
Directions.—Approaching port Simpson from the southward by Cunningham passage, the cliffs on the north-west extreme of Burnt-cliff island kept in line with the southernmost Flat-top island, bearing S. by E. ¼ E. (astern) will lead through until abreast Sarah point. Thence the mark for leading westward of Hankin reefs should be brought on astern (*see* p. 424), and when the lagoon mouth on north shore of port Simpson opens westward of the decayed tree on One Tree islet, bearing N.E., a course should be steered to pass one cable north-westward of One Tree islet, and anchor in the position before mentioned.

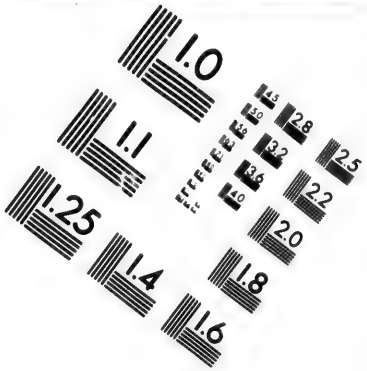
A vessel not wishing to enter by Dodd passage, should when abreast Sarah point bring that point in line with the south point of a bay on the eastern shore of Cunningham passage, bearing S.E. ¼ E. (astern), which mark will lead southward of the Harbour reefs, midway between that danger and Finlayson island.

Inskip passage, the northern and principal entrance into port Simpson, is a little over 5 cables wide, and should invariably be used by a stranger. The depths in this channel are from 11 to 20 fathoms.

Entering port Simpson by Inskip passage, Lizzie hill (on the north shore) well open southward of Birnie island bearing N.E., will lead 2 cables south-east of that island and 3 cables north-west of the Harbour reefs. When Ben hill (south shore of the bay) comes open of Bath point bearing E. by S., an E. by N. course may be steered, until Parkin island is seen just open northward of Birnie island, bearing N.W. (westerly), that mark kept on astern will lead up to the anchorage, in the depth and position before mentioned.

Indian villages.—Before the Hudson bay post was built, the villages of the Tsimpsean Indians were at Metlah catlah, but the tribe being great traders, as well as hunters, travelling long distances inland, they naturally migrated nearer the trading post. They have therefore settled along the beach on either side of the fort, and upon an island close opposite (Village island). Village island was formerly only





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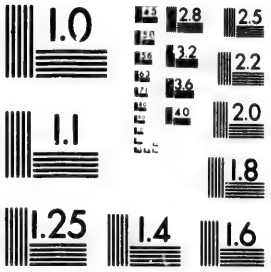

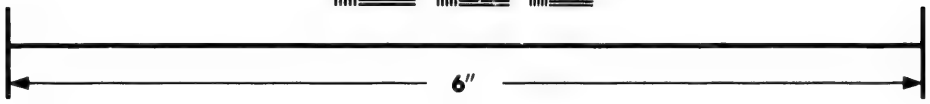

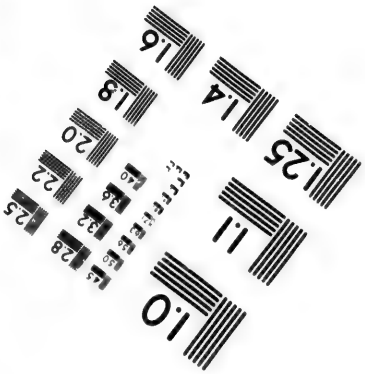

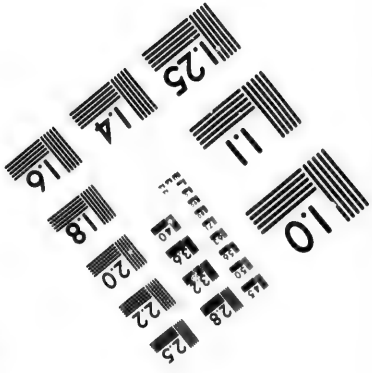

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connected with the main at low water, but the Indians have constructed a trestle bridge, about 600 feet long and from 15 to 20 feet high, connecting the island and the main (Hay point). In 1868 there were 18 houses on the beach eastward of the fort, 49 houses westward, and 66 dwellings upon Village island. Most of the houses were strong and well built, about 30 feet long, 20 to 30 feet deep, and from 15 to 20 feet in height, with a wide door facing the beach. Along the beach canoes of large size were hauled high up, close to the dwellings. In front of the houses high poles are erected, with grotesque carvings upon them, principally representing a human face, with the wings of a large bird attached to it, and frequently crowned by the figure of a bird with a long bill. The minor carvings are generally associated with the family crest, each chief and clan having a crest, the principal ones being the whale, porpoise, eagle, raven, wolf, and frog. Red and green are the predominating heraldic colours.

Population.—Like the other coast tribes, the Tsimpseans are decreasing in numbers annually, but in 1868 they numbered about 2,000.

Supplies.—Salmon, berries, shell fish, houlican oil, and dried seaweed form the principal diet of these Indians. Animal food (venison) is eaten when it can be obtained, but the winter food consists of dried salmon and houlican oil. The salmon are caught in immense quantities during the autumn and smoked over wood fires in huts. The houlican abounds in Nass river in the spring, the banks at low water being covered with dead fish. From this fish, which is larger and rounder than a sprat, a nutritious oil is extracted, and is the principal commodity of this people; the various tribes whose rivers the houlican do not visit, buying the oil in exchange for furs. Seaweed is taken in great quantities on the off-lying rocks during the low autumnal tides; it is dried and compressed into cakes and used as winter food. A great luxury with them is rice and molasses.

Wood, water, potatoes, and crabs, can be obtained in port Simpson.

Native customs.—The Tsimpseans were once a powerful and warlike tribe, nearly always at war with either the Hydahs (Queen Charlotte islands) or the Nass Indians (Portland inlet), and much dreaded by the Bella Bella and southern tribes. They are still an influential race, and object to any other tribe trading directly with the Hudson Bay Company at fort Simpson. Before granting permission for such, they expect and obtain presents.

On such occasions feasts are held. A spirit called whiskey is drunk, and under its influence they commit many crimes. Without any apparent cause old grievances are recalled, and as they invariably have their firearms beside them, they shoot one another.*

Slavery is reported to be still (1868) in existence among them. In the event of a feast terminating in murder, the aggrieved tribe sally forth in their canoes, and meeting any of the tribe of the murderer, carry the women away, first killing the men. The head of the Tsimpsean tribe in 1868 was a woman.

Sick people are kindly treated, and receive much attention from their friends. Upon the appearance of an epidemic, however, such as small-pox, this rule does not apply. So great is their dread of this disease, that those suffering from it are at once taken outside the village, a fire is lighted, some food is placed beside the sufferer, and he is then left to his fate.

The women mourn for the dead many days; they sit on the beach and utter a long, low, dismal wail. The dead are usually burnt, the corpse being conveyed away in a canoe to a distant part of the beach and there burned to ashes. Mourners accompany it, uttering piercing cries all the time the body is consuming; the ashes are then collected and placed in a little house appointed to receive them. A slave, after death, is at once placed in a canoe, and thrown into the harbour, without any sorrow being expressed.

Religion.—This branch of the Tsimpseans are not Christians like that at Metlah catlah. Some native Christians, however, teach in a mission house; but the great bulk of the population adhere to their old customs and ceremonies.

Language.—The Tsimpsean language is soft and melodious; it is spoken as far south as Wright sound. Eastward of that sound the Bella Bella dialect is spoken; the Kit i mat tribe (at the head of Douglas channel) speaking a mixture of both dialects.

The language of trading, and for communication generally between tribes speaking different dialects, is called Chinook. This jargon consists of English, French, and Indian words strung together, with no grammatical basis; it is readily acquired, and almost universally spoken by the coast tribes from the Columbia river to Alaska.

Repairs.—The great rise and fall of tide at port Simpson permits a vessel to be beached. A good site will be found for this purpose just

* It is advisable for white men, if strangers, not to visit the villages on those occasions.

westward of the fort. The bottom consists of hard sand, with a covering of weeds. H.M. surveying vessel *Beaver* was beached in this position in 1868, and did not sink into the ground beyond one inch.*

Tides.—It is high water, full and change, at port Simpson at 1h. 30m.; springs rise 17 to 22 feet, neaps 14 to 17 feet.

Chatham sound has very little current as far as the Pointers to the north of port Simpson, not more than one knot. A strong current sets out of Nass and Work channels in Chatham sound and then flows out through Dixon entrance between Dundas islands and Alaska, at the rate of about 2½ knots an hour.

Deviation.—For swinging to ascertain the deviation of the compass in port Simpson, Table hill on Dundas island 12 miles distant is conspicuous. The bearing of the nob at the north end of Table hill, from the anchorage in port Simpson, is N. 76° 00′ W. (true).

Parkin islands consist of two islands lying close together, about one cable in extent in a N.W. and S.E. direction; though small, they are 250 feet high, wooded and conspicuous. The south extreme of Parkin islands lies about 1½ miles N.W. ¼ N. from the north extreme of Birnie island, and 6 cables from the nearest shore (Black point).

Maskelyne point, the south-west entrance point of Portland inlet, and the north-west entrance point of Work channel, lies 3 miles S.E. ½ S. from Wales point. Vancouver obtained the depth of 8 fathoms, soft bottom, half a mile from Maskelyne point. Deep water was found within one cable of that point (1868).

Maskelyne point is situated in latitude 54° 38′ 30″ N., longitude 130° 27′ 0″ W.

Work channel, the entrance to which lies close northward of point Maskelyne, takes a south-easterly direction for about 35 miles; near its termination it divides into two arms, one branching off to the north-west for 5 miles, and then turning suddenly to the north-east for the same distance; the other arm continuing to the south-east, and approaching within one mile of the Skeena river; this channel has not been examined in detail since the visit of Vancouver. At its entrance Work channel is barely 4 cables wide, which width it preserves for about 7 miles, when it widens

* H.M.S. *Virago* was repaired on the beach opposite the fort in 1853. The vessel was lightened to 11 ft. 6 in. forward, and 12 ft. 6 in. aft, the stores with the exception of the guns and cables being lodged in the fort. On the 22nd June, during the night tide, the vessel was warped into her position, and remained there until the 8th July, during which time the gripe and fore part of main keel (26 feet long) was repaired, and 65 sheets of copper replaced on various parts between the bilge and keel. The night tides were during that period about 3 feet higher than the day.

to 1½ miles, and afterwards to 2 miles; its shores are stated by Vancouver to be "straight and compact."*

WEST COAST OF CHATHAM SOUND.

PRESCOTT and STEPHENS islands lie in the south-western part of Chatham sound, and are separated by a narrow passage available only for boats. These islands together are about 12 miles long in a W. by N. and E. by S. direction, of triangular shape, the base of the triangle being 4 miles long, and forming the north-west side of Stephens island.

Prescott island has an elevation of 820 feet. Stephens island attains an elevation of 1,340 feet near its east end; its southern shores are comparatively low, with some white cliffs near the centre.

Tree-nob groups are a mass of islands, islets, and rocks awash at low water, which extend 6 miles in a north-westerly direction from the N.W. side of Stephens island. The larger islets are wooded, and the smaller bare. Vancouver, who nearly met with disaster among them, describes them as "an intricate inhospitable labyrinth."

EDYE PASSAGE† lies on the south side of Prescott and Stephens islands, and is the channel usually taken when communicating between Chatham sound and Hecate strait, as, by using it, vessels avoid the strong and irregular tides met with in Brown passage. It is comparatively free from danger, and at its northern end possesses an excellent anchorage (Refuge bay), in which a vessel may await a favourable opportunity for proceeding. The general depths in Edye passage vary from 23 fathoms to no bottom at 40 fathoms.

Cape Ibbetson, the south-west point of entrance of Edye passage, is situated in latitude 54° 2′ 30″ N., longitude 130° 42′ 45″ W.

Goschen island.—Approaching Edye passage from the southward, the oval-shaped hill, 630 feet high, near the western extreme of Goschen island is conspicuous, and at 2 miles northward of that hill lies another, with a flat summit, 170 feet high. At 3 miles southward of the latter, the western shore of Goschen island terminates in high white cliffs.

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* Captain Brundige states that a rock just visible at low water exists in Work channel a few miles from the entrance. This rock is situated just abreast mount McNeil, in the centre of the channel. It is described as having a very small top with a depth of 130 fathoms close to it.

† *See* Admiralty plan :—Brown and Edye passenges No. 3245; scale, m = 1 inch.

The south-western side of Goschen island has several rocks awash, and sunken rocks extending one mile off it in a westerly direction.

Bass rock, 30 feet high, situated close to the shore of Goschen island under Oval hill, is small, and bare.

A rocky ledge, with depths of 4 to 8 fathoms upon it, extends westward nearly 4 miles from the south-west side of Goschen island, in the vicinity of the Bass rock.

Clearing mark.—The conspicuous white cliffs on the south side of Stephens island should not be brought to bear westward of North when approaching the western shore of Goschen island.

Seal rocks, a cluster of bare rocks of small extent, 10 feet above high water, the centre of which lies 5 miles N.W. by W. $\frac{3}{4}$ W. from the summit of Oval hill, and 4 miles S.S.W. $\frac{1}{4}$ W. from cape Ibbetson (south-west entrance point of Edye passage), have depths of 12 to 31 fathoms at 2 cables from them.

Warrior rocks, two bare rocks 30 feet above high water, lie E. by S., and W. by N., distant 8 cables from each other. The eastern rock lies $3\frac{3}{4}$ miles N.W. $\frac{1}{2}$ W. from the centre of the Seal rock cluster.

Deep patch, situated at the western entrance of Edye passage, is stated to have 19 fathoms upon it; there is, however, probably less water on this patch, as kelp was observed growing upon it in August.

The patch is of small extent, and lies one mile N.N.E. from cape Ibbetson, and $2\frac{1}{4}$ miles S.W. by W. $\frac{3}{4}$ W. from the south extreme of Arthur island.

Clearing mark.—The south extreme of Arthur island (View point) seen in line with the south-east extreme of that island bearing E. by N. $\frac{3}{4}$ N., will lead northward of Deep patch.

Truscott patch, with 16 feet water upon it, lies $1\frac{3}{4}$ miles E.N.E. from cape Ibbetson, and 6 cables from the nearest shore of Henry island.

Foul ground extends off the south-eastern side of Arthur island to the distance of 3 cables.

Tides.—The flood approaches from the westward, and both streams, set fairly through Edye passage, with an average rate of 2 knots an hour.

Directions.—Approaching Edye passage from the south-westward, the eastern portion of the high white cliffs on the south side of Stephens island should not be brought to bear westward of North until Oval hill, on Goschen island, is seen in line with Seal rocks bearing S.E. by E. $\frac{3}{4}$ E. Thence a N.E. $\frac{1}{4}$ N. course may be steered for the entrance to Edye passage, taking care not to shut in Oval hill with cape Ibbetson until the south and

south-east points of Arthur island are seen in line. The latter mark may then be steered for, bearing E. by N. ¾ N., until Seal rocks are seen in line with cape Ibbetson bearing S.S.W., when a more easterly course may be steered to pass half a mile southward of the south extreme of Arthur island. When the entrance points of Refuge bay are seen in line, that mark may be steered for, bearing N.E. by N., taking care to avoid the small patch, which uncovers at low water, 3 cables from the south point of Useless bay. Pass 2 to 3 cables westward of the south entrance point of Refuge bay (Pearce point), and if not desirous of anchoring in that bay, a N.W. by N. course should be steered towards Rachel islands, passing midway between that group and Gull rocks, whence steer as requisite for destination.

REFUGE BAY,* situated at the north-west extreme of Porcher island, at the north entrance of Edye passage, is an excellent stopping place during south-easterly winds, or if desirous of proceeding to sea from Chatham sound by the Edye passage, the state of the weather in Hecate strait can be ascertained. The bay is 7 cables wide between its entrance points, and takes a south-easterly direction for about one mile, terminating in a sand-flat which extends nearly half a mile from its head.

The depths in the middle of the bay are from 14 to 23 fathoms, sand, shoaling gradually towards either shore.

Anchorage will be found in 12 to 14 fathoms, sand and mud, near the middle of the bay, about 2 cables from the north and south shores, with the north entrance point (Table point) bearing N.N.W., and Pearce point bearing W. by S. ½ S.

Tides.—It is high water, full and change, in Refuge bay at 1 h. 30 m.; springs rise 17 to 22, neaps 14 to 17 feet.

BROWN PASSAGE between Tree nob islands and South Dundas islands, is about 5 miles long in an E. by N. and W. by S. direction, and 5 miles wide.

Nearly in mid-channel, however, lies a cluster of rocks, awash at high water, which divides Brown passage into two channels.

Butterworth rocks, are a dangerous cluster of rocks, the southernmost of which is 10 feet above high water, with several patches which uncover at low water extending from it in a north-westerly direction to the distance of three-quarters of a mile. This rock lies 3½ miles S.S.W. ¼ W. from Bare island, the south-western island of the Tree nob group; with that island in line with some wooded islands forming the north-west cluster of Tree nob group (Osborne islands).

There is deep water between Butterworth rocks and Tree nob islands.

* *See* Admiralty plan :—Refuge bay, on sheet No. 2,453; scale, *m* = 4 inches.

Stenhouse shoal, a dangerous patch with 7 feet least water upon it, and reported to be 50 yards in extent, lies at the western entrance of Brown passage, 6½ miles S.W. ¾ W. from Cape islet, the south extreme of South Dundas island; 5½ miles W. by S. from the Hanmer rocks; and 5 miles W. by N. ½ N. from the outer Osborne island.

North breaker, over which the sea usually breaks, is the outer known danger extending north-west from the Tree nob group, and lies one mile W.N.W. from the outer Osborne island.

Hanmer rock, a dangerous rock, nearly in mid-channel, 2½ miles N. by E. from the outer Osborne island, and 2½ miles S. ¾ W. from Cape islet, is awash at high water, with depths of 12 and 32 fathoms close to; there are several patches which uncover, extending from Hanmer rock in a W.N.W. direction to the distance of three-quarters of a mile.

Simpson rock lies on the north side of Brown passage three-quarters of a mile S. by W. from Cape islet; this rock is 6 feet above high water, with rocks awash extending half a mile westward, and a depth of 17 fathoms at 4 cables southward of it; there is a patch which uncovers 3 feet at low water, at 3 cables S.E. of Simpson rock.

Beaver rock, with 12 feet water on it, lies 1¼ miles S.S.E. from the S.E. extreme of South Dundas island (Deans point); several patches of rock lie between Beaver rock and the shore of South Dundas island. There are depths of 13 and 17 fathoms at 4 cables southward of Beaver rock.

Soundings.—The water in Brown passage is deep, being over 39 fathoms. Depths of 20 fathoms and less extend from one mile to 1½ miles off the south shore of Dundas island.

Tides.—In Brown passage the tides set fairly through at an average rate of 2 knots an hour. The flood stream sets to the eastward, and off the western entrance to this passage the tides are strong and complicated.

Directions.—Brown passage is not recommended to a stranger, but should circumstances compel him to make use of it, the eastern peak of the four-peak range, on South Dundas islands, should be steered for, bearing N.E. by N., until the eastern and highest Lucy island bears E.N.E., which will lead through Brown passage south of Hanmer rock, or bearing E. ¾ N. will lead through, northward of this rock.

QLAWDZEET ANCHORAGE* lies on the north-west side of Stephens island, and it was into this bay Vancouver was conducted by the officer of the *Butterworth* from his dangerous position amidst the Tree nob group. Qlawdzeet is exposed to the N.W., is three-quarters of a mile wide at its entrance, and one mile deep in a southerly direction.

* *See* Admiralty plan: Qlawdzeet anchorage, on sheet No. 2,453; scale, *m* = 4·0 inches.

Entrance reef, awash at high water, lies 2 cables N.W. from the eastern entrance point of Qlawdzeet bay.

Directions.—The entrance to Qlawdzeet bay will be made if the north extreme of Tugwell island is kept in line (astern) with the eastern island of the Lucy group, bearing N.N.E. ½ E.

Keep in mid-channel when entering, and anchor at 3 cables within the bay and 1½ cables off the south shore, in 12 to 14 fathoms, mud bottom, with the eastern entrance point of the bay bearing N.E. ¼ N., distant 4 cables, and the western entrance point bearing W. by N. ¼ N., distant 6 cables.

Tides.—It is high water, full and change, at Qlawdzeet anchorage at 1 h. 30 m.; springs rise 17 to 22, neaps 14 to 17 feet.

Bay islands, on the south side of South Dundas island, are reported to afford anchorage off their north-west side. The "*Butterworth*," however, "on coming out struck upon a rock which seemed to be a small pinnacle by itself as no soundings were gained near it." (*See Vancouver's Voyages, Vol. II., p. 325.*)

The examination of this locality has shown the existence of many sunken rocks, the anchorage under Bay islands should therefore not be attempted.

DUNDAS ISLANDS, on the western side of Chatham sound, were so named by Vancouver; they consist of three islands, the northernmost being the largest and highest. A number of smaller islands (Moffat islands) lie close to the eastern shores of South and Middle Dundas islands. The western shores of the group have not been thoroughly examined but they are much broken into bays and inlets, with several small off-lying islets.

South Dundas island is about 3 miles long, in a N.W. and S.E. direction, and 5 miles broad, its shores being comparatively low, wooded, and broken into bays on the south and western sides. Near the middle of the island a mountain range rises to the height of 1,400 feet, with four conspicuous peaks which lie in a N.E. and S.W. direction. The eastern and highest peak of this range is 1,400 feet high, the western and lowest 1,100 feet high.

Middle Dundas island lies about 2 miles to the north-westward of South Dundas island, the passage between being obstructed by numerous low, wooded islets, rocks, and sunken dangers. The island is nearly 5 miles long in a N.W. and S.E. direction, with a greatest breadth of 5 miles; it is mostly low and wooded, with numerous creeks and bays on its shores. Near the southern end of the island the land suddenly rises in an oval-shaped hill (Coast mound) 750 feet high, which is a useful land-mark.

Connel islands, a group of small wooded islands, lie off the western side of Middle Dundas island. The outer or south-western island of the group lies off the entrance to the passage between South and Middle Dundas islands, about 2 miles from the western shores of the latter, and 7 miles N.W. from Osborne islands.

North Dundas island is about 12 miles long, in a north and south direction, and about 7 miles broad near its north end. This island, the highest and largest of the group, culminates in a mountain with a thumb-shaped summit, 2,500 feet high, about 4 miles from the south end of the island. Near the north extreme of North Dundas island there is a hill 700 feet high, with a flat top, and a nob near its north end (Table hill), a most conspicuous and useful mark. The eastern shore of North Dundas island is but little broken; bold, with a range of coast hills about 300 feet high, rising immediately above it. On the northern side, nearly midway between Whitley point and White islands there is a deep bay, though useless as an anchorage, at the entrance to which lies a group of small wooded islets (Gnarled islands). Off the north-west extreme of the island, close to the shore, are two conspicuous rocks (White rocks).

The western shore of North Dundas island has not been examined in detail. Several islands were, however, seen lying off that shore to the distance of 2 miles.

Captain Brundige put into a small harbour on the north end of North Dundas island. "He says, I found a small river there which extended 5 miles or more into the island."

ZAYAS ISLAND is the largest of the islands which lie off the western shore of North Dundas island. The extent of this island has not been ascertained, but it appeared to be about 4 miles long, in a north and south direction, and about two miles broad, wooded, and about 250 feet high. A ledge of rocks, which uncover at low water, was observed to extend nearly one mile from the north-west extreme of Zayas island. From the west side of the island, rocks are said to extend 3 miles.*

Zayas island appeared flat and heavily timbered and probably 3 or 4 miles in extent.†

CHANNEL ISLANDS are a group of wooded islands, about 100 feet high, extending across the channel between Middle and North

* It has been reported that an uncovering rock lies in mid-channel between Zayas and North Dundas island, two more rocks rather close in on north side of Zayas, and three small islets less than one mile from its north-west extreme (probably White islets of the chart.) Besides these, dangers, (presumably sunken), are shown as lying 3 miles west from the north-west point of North Dundas, and 2 miles north from the north-west extreme of Zayas.

† Lieutenant Commander Nicholls, U.S.N., 1881.

Dundas islands. This group renders that channel useless for any but the smallest class of sailing vessel. The passage, however, is frequently used by the Hydah Indians, in their large canoes, when proceeding from Queen Charlotte islands to port Simpson.

Moffatt islands consist of six principal wooded islands and several lesser ones, the highest being about 250 feet in height. This group, which lies close to the eastern shore of the Dundas islands, extends over a distance of 6 miles in a N.W. and S.E. direction. When abreast, these islands show out well, being covered with pine trees of a peculiar deep green foliage.

Ducie island is a small wooded islet, 350 feet high, lying one mile N.W. from the Moffat group. Two conspicuous white rocks, 30 feet high, lie 3 cables westward of Ducie island.

Whitesand islet is a small sandy islet, about 10 feet above high water, lying 6 cables N.E. by E., from Ducie island. A ledge of rocks, which uncover, extends N.W. and S.E. from Whitesand islet, to the distance of 4 cables.

Hammond rock, of small extent, with 9 feet water over it, lies 9 cables E.N.E. from the south-eastern extreme of the S.E. Moffat island, and 4¼ miles E. ½ N. from Coast mound. This rock has 34 fathoms close northward of it.

Coghlan rock, with 3 feet water, and 6 and 7 fathoms close around, lies 2 miles N.W. ¼ N. from Hammond rock, and 3½ miles N.E. by E. ¼ E. from the summit of Coast mound. There are depths of 43 and 46 fathoms, mud bottom, at one mile northward of this rock.

Brodie rock lies 3¾ miles N.W. from Coghlan rock. This dangerous pinnacle rock has only 3 feet water over it at low water, with depths of 26 and 33 fathoms at a distance of 100 feet.

The Rachel group of islands, kept open northward of the Lucy group, bearing S.E. ½ S. will lead northward of the above-mentioned dangers; but during a fog, or in thick weather, the western shore of Chatham sound must not be approached under the depth of 40 fathoms.

Pointers rocks, are a dangerous cluster of bare rocks, 3 feet above high water, about 2 cables in extent in a north and south direction. The southernmost and highest rock lies 3 miles W.N.W. from the north extreme of Finlayson island and 2¾ miles W.S.W. from the north extreme of Birnie island. There are depths of 40 fathoms, no bottom, at half a cable westward; and 12 fathoms, rocky bottom, at one cable eastward of Pointers rocks.

Connis rocks consist of one large and several small rocks, nearly in the middle of Main passage into Chatham sound, abreast port Simpson.

The southernmost and highest rock, 15 feet above high water, is bare, and from it rocks extend 2 cables in a northerly direction. The summit of this rock lies 5 miles W.S.W. from the north extreme of Finlayson island, and 3⅜ miles S.S.W. ¾ W. from Pointers rocks.

There are depths of 81 fathoms, 91 fathoms, and 92 fathoms, mud bottom, at the distance of one mile, S.E., S.W., and N.E., of these rocks respectively.

Vancouver remarks:—"These in the daytime and clear weather are "easily avoided, as there are always some of them above the surface of "the water; but in dark nights, or foggy weather, they must render the "navigation of the sound very dangerous."

Green islet, situated on the western shore of Chatham sound, about 1½ miles from North Dundas island, is covered with long grass during the summer. It is small, 40 feet above high water, and has a small bare rock lying close northward, and another close southward.

The middle and largest islet lies 3 miles S.W. by W. from the Connis rocks.

Grey islet is a small bare rock, of a greyish colour, 30 feet above high water, 9 cables North from Green islet.

A sunken rock, with 6 feet water upon it, lies one mile W.N.W. from Grey islet. There are depths of 19 and 27 fathoms at one cable from this rock.

A sunken rock, with 4 feet water upon it, lies 3 cables South from Grey islet, between it and Green islet.

MAIN PASSAGE, situated between Pointers and Connis rocks, is 3½ miles wide, with depths of 128 fathoms, at one mile south-west of Pointers, and 92 fathoms, at one mile north-east of Connis rocks. Both Connis and Pointers rocks may be approached to within a distance of half a mile.

ORIFLAMME PASSAGE lies westward of Connis rocks, between that cluster and Green and Grey islets. It is nearly 3 miles wide, with depths of 23 fathoms at 2 cables eastward of Green islet, and 65 and 70 fathoms, mud bottom, at 7 cables southward of Connis rocks.

The passage between Dundas island and the Green and Grey islets, is nearly 1½ miles wide. The tides in this passage are strong, and the channel is not recommended to a stranger.

Gnarled islands, a group of wooded islands, about one mile in extent in an east and west direction, lying off the north-west side of the North Dundas island, is from 150 to 250 feet in height; the eastern islet lies 2¼ miles W. ¼ N. from the N.E. extreme of the Dundas group.

The channel between Dundas and Gnarled islands is obstructed by ledges which uncover, and sunken rocks.

White islands are two bare rocks, about 30 feet high, lying half a mile from the north-west extreme of North Dundas island.

DIXON ENTRANCE* is the channel between Prince of Wales and Queen Charlotte islands, passing northward of Dundas islands. Several sunken rocks, of doubtful position, are reported to lie in the western part of this passage, on or near a line joining the north end of the Dundas group and the south end of the Prince of Wales group.†

Various positions have been assigned to the East Devil rock (one of the dangers lying in Dixon entrance), but Captain Brundige states that it is situated about 4 miles north-westward of Zayas island, in latitude 54° 40′ N. longitude 131° 6′ W. According to the report of the commander of the Hudson Bay Company's Seamer *Otter*, Devil rock is marked by a breaker, and is awash at low water.

McCullough rock on which the sea breaks is said to have been discovered by Captain McCullough. From it the north-west end of Zayas island bears N.E. ½ E., and the southern end East, whilst the western shore of Zayas island is distant about 3 miles in a S.E. ½ E. direction.

Cape Fox, so named by Vancouver, lies about 7 miles N.N.W. from the Gnarled island group, and terminates in remarkable high, white cliffs, with a conspicuous saddle-shaped mountain 2,066 feet high, immediately over it.

Lord islands, a group of about one mile in extent, lying 2½ miles south-east from cape Fox, is wooded and about 250 feet high; the south-west island is distant 5 miles from the outer or north-western island of the Gnarled island group.

Lord rock, which uncovers 3 feet at low water, lies 8 cables S.W. by S. from the south-west island of the Lord group.

Soundings.—At 8 cables northward of the Gnarled island group, there is a depth of 155 fathoms, rocky bottom; and at 8 cables southward of the Lord island group, a depth of 73 fathoms, gravel bottom was obtained. The depths in mid-channel are 103 and 110 fathoms, gravel

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* *See* Admiralty chart :—Port Simpson to Cross sound, No. 2,431; scale $m = 0{\cdot}15$ of an inch.

† The position of a danger, termed the West Devil rock, was approximately determined by Captain Carroll commanding the steamer *Idaho* on November 23rd, 1883. He places it in latitude 54° 41′ 30″ N. longitude 131° 31′ 0″ W. This officer also reports that on April 13th of the same year he sighted a breaker about 7 miles S.E. ¾ E. from Cape Chacon, and that the Nuñez reef lies 6 miles S. by E. ¼ E. from the same cape.

bottom; deepening to 170 and 214 fathoms as Chatham sound is approached.

Nakat inlet has its entrance between cape Fox and Tongass island, and extends about 11 miles in a N.N.W. direction.*

Nakat inlet was explored by Vancouver in 1793. He says, "The inlet took a nearly north direction, and at half a league from the entrance point the eastern shore formed three small bays or coves with four or five islets before them. From this the trend of the inlet was N. 8° W; the shores nearly straight and compact, and in general about half a mile asunder. The surrounding land was of moderate height, and of that uneven surface generally exhibited by the insular countries lying on the sea coast. The head of the arm terminated in a small fresh-water brook flowing from low marshy ground. Before it were several rocks and some rocky islets. On the low land forming the upper extremity of this arm, we saw some animals like wolves, but the shallowness of the water prevented us approaching near enough to fire.

TONGASS ISLAND, about 3 miles eastward of Cape Fox, and about 16 miles north-west of port Simpson, was chosen in 1867 as a military post by the United States, after purchasing Alaska. Fort Tongass is small, and was garrisoned by one Company (1868); the settlement is dreary, and the almost constant rain and soft soil produces mud of a most tenacious nature.

Anchorage.—The approaches to Tongass settlement are intricate and require local knowledge; the anchorage abreast the fort is bad, with deep water and limited accommodation even for a vessel of moderate length. H.M.S. *Sparrowhawk* experienced great difficulty in turning abreast fort Tongass owing to wind and tide.

Directions.—The principal approach to Tongass is from the westward and is about half a mile wide. There are said to be depths of 5 and 8 fathoms within this passage.

The approach from the south-east is about 3 miles long, and passing between numerous islets, is in places barely one cable wide. The depths in this passage are said to be from 5 to 16 fathoms.

At the southern end of the narrows is a dangerous shoal, in mid-channel, which is best avoided by keeping near the shore, but care should be taken not to overdo it, as the bottom is shelving, and deep water will not be found quite close to the bank. When past the above-mentioned shoal and

* In Nakat inlet, in the further bight inside the group of islands, is a well sheltered harbour with anchorage in less than 15 fathoms which has been visited by U.S.S. *Hassler*, United States Pacific Coast Survey, 1883.

about half a mile inside, a mid-channel course can be steered up to the large opening on the west shore, when, by crossing over to that shore, the shoal water off the mouths of two rivers, which will be seen on the eastern shore, will be avoided.

After passing the northernmost of the two rivers the eastern shore should be again closed, which will then be found to have deep water close to it. Keep along this shore till nearly up to Ward cove, when steer to pass west of the islands off it, after which pass north of the rocks and islets north of cape Vallinas.*

The following is from a report to the U.S. Government upon Tongass :— The harbour, in and about it, is in rather a bad situation, surrounded by rocks, reefs, and shoals, on the outside and inside.

Tlechopcity harbour (or Clement's city), is one of the south-eastern approaches to Tongass from Chatham sound. This passage is intricate and constricted.

Boston islands, lying off Wales island, at the south-eastern approach to Tongass, are about one mile in extent, in an east and west direction. The larger islands are wooded, about 150 feet high ; the smaller ones are bare, 50 feet high. The western island is 450 feet high, round, wooded, and conspicuous.

A ledge, which uncovers at low water, lies one mile E. by S. from the easternmost of the Boston islands, and one mile from the nearest shore of Wales island.

WALES ISLAND, situated on the north-west side of the entrance to Portland inlet, is about 7 miles long in an east and west direction, its north-eastern side being about 4 miles long. The north-eastern shore is bold, with some conspicuous cliffs of red-brown colour, nearly midway between the north and south extremes of the island. A small islet lies close to the shore at the north extreme. On the south side, about one mile westward of Wales point, the south-east extreme of Wales island, a deep bay faces south-eastward, and within it are some patches which uncover, and rocks awash. A wooded islet, about half a mile long, in a N.W. and S.E. direction, lies off the entrance to this bay, $1\frac{1}{2}$ miles S.W. $\frac{1}{2}$ W. from Wales point. A smaller islet lies one mile south-westward of the larger one.

Entry peak, about half a mile north-west of Wales point, is 1,400 feet high, of triangular shape, with a sharp conspicuous summit. A mountain, with a flat summit, 1,100 feet high, is situated near the middle of Wales island.

* Lieutenant Lang, R.N., H.M.S. *Mutine*, 1883.

Cod bank, with depths of 33 and 47 fathoms, mud and shells, lies between Pointers rocks and Parkin island, extending from the latter within the 50 fathom line, to the distance of 1½ miles.

There is a depth of 109 fathoms, mud bottom, at 5 cables south, and 99 fathoms, rock, at 5 cables north of Cod bank. Cod fish of large size are caught upon this bank.

Tides.—The tides in Dixon entrance and Brown passage, especially in the western parts of those channels, are variable and complicated. The flood stream approaching from the southward up Hecate strait is met by the stream passing westward and northward of Queen Charlotte islands at about 15 miles eastward of Rose point, or about midway between the north-east extreme of Queen Charlotte islands and the Tree nob group. Northward of that position this meeting of the streams produces tidal irregularities, and at spring tides or during bad weather the turmoil caused by the meeting of the streams is so great as to convey an appearance of broken waters to that portion of them which lies between Queen Charlotte islands, Brown passage, and Dixon Entrance. In Chatham sound the tides set fairly through.

CHAPTER XII.

INNER WATERS.—LAREDO SOUND TO OGDEN CHANNEL.

VARIATION IN 1888.

Laredo sound, 26° 00′ E. | Ogden channel, 26° 40′ E.

LAREDO SOUND,* situated between Price and Aristazable islands, and connecting Hecate strait with Laredo channel, is nearly 20 miles long in a general N.N.W. and S.S.E. direction, and from 3 to 14 miles wide.

Landmarks.—Kititstu hill on the north-eastern shore of the sound, is of triangular shape, with a well defined summit 760 feet high. Over the north shore of the sound rise three remarkable mountains, the summits of the two northern having sharp pinnacles (north and south Needle peaks), 2,600 and 2,800 feet in height. The summit of the southern and lowest of the three peaks (Cone mountain) is of conical shape, 2,400 feet high. At 4 miles from the eastern extreme of Aristazable island, two conspicuous hills, forming a saddle, rise to the height of 640 feet.

Coast.—The eastern shore of Laredo sound is low, wooded, much broken into bays and creeks, and fringed by numerous islets, rocks awash, and sunken rocks, to the distance of 2 miles from the west coast of Price island. Outer island, which lies off Day point, when seen from Laredo sound appears round and well defined.

At the western entrance of the sound a group of islands and islets extend from Aristazable island for a distance of more than 5 miles in a south-easterly direction.

Entrance island, 250 feet high, and three-quarters of a mile long in a north-west and south-east direction, is the outer of a chain of islands lying off the south extreme of Aristazable island.

* *See* Admiralty charts :—Cape Caution to port Simpson, southern portion, No. 1,923 b ; scale, $m = 0{\cdot}25$ of an inch ; also northern portion, No. 1923 a ; scale, $m = 0{\cdot}25$ of an inch.

Nab rock, a dangerous sunken rock, over which the sea only breaks at long intervals, lies $3\frac{8}{10}$ miles S.E. by E. from the summit of Entrance island.

The ground is foul to the distance of one mile south-east from the rock, and several ledges uncover at low water between Nab rock and Entrance island.

Don point, situated on the western shore of Laredo sound, 4 miles N. by E., from the summit of Entrance island, is a peninsula 150 feet high, and when first seen, appears as an island. Close northward of Don point is a small cove, which affords shelter to boats.

Double island, on the eastern shore of the sound, $16\frac{1}{2}$ miles N.W. $\frac{1}{2}$ N., from the summit of Outer island, is wooded, about 100 feet high, and divided near the centre by a cleft which causes it to appear as two islands, when seen from the southward and northward.

Low point, wooded and flat, lies $2\frac{1}{2}$ miles N.N.W. from the summit of Double island.

Low rock, which uncovers at low water, lies 4 cables N.N.W. from Low point.

Schooner point is the turning point into Laredo channel, and lies 7 miles N. by W. from Don point. The coast of Aristazable island between Schooner and Don points is bold and rocky.

Schooner ledge, which uncovers at low water, lies 3 cables northward of Schooner point.

South Bay islands, a group of small extent, lie at the head of Laredo sound. The larger islands are wooded, and 250 feet high. The centre island of the group lies $2\frac{1}{2}$ miles N. $\frac{1}{2}$ W. from Low point, and $3\frac{1}{4}$ miles E.N.E. from Schooner point.

North Bay islands consist of three principal wooded islets, of small extent, 250 feet high. The centre island of the group lies $1\frac{1}{2}$ miles N.W. from the centre island of the South Bay group.

Steep point, high and bold, forming the north-east entrance point of Laredo channel, lies 2 miles N. by E. from Schooner point.

Soundings.—At 3 miles W.S.W. of Outer island there is a depth of 100 fathoms, mud. At 9 miles W. $\frac{1}{2}$ N. from that island, and 4 miles south-east of Nab rock, a depth of 19 fathoms, rock, was obtained. Between those positions the depths are from 42 to 65 fathoms, sand. This bank of comparatively shoal water stretching across the mouth of Laredo sound, should serve to distinguish that sound, in thick or foggy weather, from Milbank sound, there being depths of over 120 fathoms at the entrance of the latter.

Directions.—Small sailing coasting vessels, to avoid the light winds and calms which frequently prevail in the inner channels, make use of Laredo sound and the channels leading northward from it, as the wind seldom fails them there.

In clear weather, if Outer island be not brought to bear southward of East, a vessel will pass south of Nab rock. Kit it stu hill steered for on a N. ½ E. bearing will lead eastward, and Schooner point bearing N.N.W. leads northward of Nab rock. Pass one mile off Schooner point and proceed through Laredo channel as herein-after directed.

LAREDO CHANNEL, between Princess Royal and Aristazable islands, is about 20 miles long in a general N.W. by W. and S.E. by E. direction, and from 2 to 5 miles wide.

At 6 miles within the eastern entrance Laredo channel is obstructed by a group of islands and islets, which contracts the navigable channel to barely 7 cables wide. Westward of that group, the channel again widens out, and attains a width of 5 miles at its western end.

Fury point on the south shore, terminates in black, smooth, rocks. A small bay, with a sandy beach at its head, and an islet at its entrance, lies close eastward of Fury point. The point lies 4 miles N.W. by W. ½ W. from Schooner point.

Beaver ledge uncovers at low water, and lies half a mile from the south shore, at $1\frac{2}{10}$ miles westward of Schooner point. There is deep water close northward of this ledge.

Islet rock lies close southward of a small islet on the north shore, at 1½ miles westward of Steep point.

South Channel islands, consisting of five principal wooded islands, 150 feet high, and about one mile in extent in an east and west direction, lie nearly in mid-channel, 6 miles from Schooner point.

North Channel islands consist of two principal wooded islands of small extent. The eastern island of the group lies 1½ miles N.W. by W. from the western island of the South Channel group.

Channel rock is a dangerous sunken rock, lying nearly in mid-channel, 6 cables S.E. by E. from the eastern islet of the South Channel group.

Bluff point lies on the south shore 7½ miles N.W. by W. ½ W., from Fury point; it is high and bold, with a hill 400 feet high rising immediately over it. On the north shore of Laredo channel, abreast Bluff point, is an islet at the mouth of a creek.

Seal rocks, which cover at high water, and are of small extent, lie half a mile from the south shore, 2 miles W.N.W. from Bluff point. There is deep water at two cables northward of Seal rocks.

Sandspit point, situated N.W. by W., 5½ miles from Bluff point, is white and conspicuous, with a ridge of bare hills, 700 to 950 feet high, immediately over it.

Sandspit shoal extends half a mile northward from Sandspit point.

Devils point, the western entrance point of Laredo channel, lies 4 miles W.N.W. from Sandspit point. Over this point is a bare hill with a conspicuous boulder or nob on its summit.

Spray point, the north-east entrance point of Laredo channel, is bold, high, and lies 5 miles N.E. by E. ⅔ E. from Devils point. At one mile eastward of Spray point a small islet lies close to the north shore.

Soundings.—No bottom could be obtained at 40 fathoms in Laredo channel.

Tides.—The flood stream which approaches from Laredo sound, increases in strength as the Channel island group is approached, attaining a velocity of 6 knots an hour at springs, in the channel north of that group (Surge narrows).*

In the wider portions of Laredo channel both streams attain a velocity of 3 knots an hour at springs.

Midway between Devils and Spray points, the flood stream by Laredo channel is met by the stream passing round the north-west end of Aristazable island, causing at springs dangerous tidal races in that locality.

The ebb stream having divided in mid-channel off Devils point, one portion sets round the north-west end of Aristazable island. The other sets fairly down Laredo channel, and attains a velocity of 6 knots an hour, at springs, in Surge narrows. From Surge narrows the ebb stream sets directly towards Fury point, and thence sweeps along the southern shore of the channel, passing across Laredo sound to Low point, whence it is deflected and sets fairly to the southward.

Directions.—Having rounded Schooner point at a distance of one mile, a N.W. by W. ¾ W. course for 6 miles should lead into Surge narrows, taking care, especially if the ebb stream be running, to avoid Channel rock.

Westward of Surge narrows, a general course of N.W. by W. ½ W. will lead through Laredo channel to the entrance of Estevan sound.

CAMPANIA SOUND between Princess Royal and Campania islands, is 5 miles long in a general N.N.E. and S.S.W. direction, and 3 miles wide.†

* It is high water, full and change in Surge narrows at 6h. 0m.; springs rise 12 feet.

† H.M.S. *Heroine* passed out in 1883. Remark book Navigating Officer H.M.S. *Heroine*.

On the eastern shore of the sound, a conspicuous ridge of hills, with rounded summits, rise to the height of 900 feet, and the coast is slightly broken into a few useless bays and creeks.

On the western shore, the coast off Campania island is indented with a few rocky bays. At the south-west entrance of the sound, 3 cables from the south-east extreme of Campania island, lies Eclipse island, a small wooded islet, 100 feet high.

The western shore of the sound, for one mile northward of Eclipse island, has ledges which uncover to the distance of half a mile. Northward of that position, the western shore has no known danger beyond 2 cables from it.

The eastern shore of the sound has ledges extending from it to a distance of half a mile.

South Surf islands, situated at the south-east entrance of Campania sound, consist of three wooded islands 250 feet high, with several small rocky islets close to.

North Surf islands, 250 feet high, lying three-quarters of a mile W. by N. ½ N. from South Surf islands, consist of three wooded islands one mile in extent N.N.W. and S.S.E.

Soundings.—No bottom at 40 fathoms could be obtained in Campania sound.

SQUALLY CHANNEL, situated between Gil and Campania islands, is 10 miles long in an E.S.E. and W.N.W. direction, and from 2½ to 4½ miles wide.

GIL ISLAND,* which forms the north side of Squally channel, is 15 miles long in a N.W. by N. and S.E. by S. direction, and 6 miles broad. Turtle point, the north extreme of the island, is a peninsula, with small bays east and west of it. The north shore has a few indentations along it, scarcely deep enough to be called bays.

Mount Gil is situated near the north-east end of the island, and attains the elevation of 3,000 feet, the summit being well defined, and always clad with snow on the north side; from mount Gil the land slopes gradually towards the north extreme of the island.

A ridge of mountains, 1,500 to 2,000 feet high, extends in a southerly direction from mount Gil, curving gradually to the south-eastward, and terminating at about 3 miles from the south end of the island.

The south-east extreme of Gil island is wooded, flat, and low.

Channel reef uncovers at low water, and extends half a mile from the south extreme of Gil island (Ledge point), and fringes the shore of

* Isle de Gil of the early Spanish charts, and Vancouver.

that island, at the same distance, for 1½ miles north-westward of Ledge point.

Windy islets are a group of three islets, the outer of which lies half a mile from the south-west shore of Gil island, at 2 miles westward of Ledge point.

Windy rock uncovers at low water, and lies half a mile E.S.E. from the outer or south Windy islet. There is a depth of 20 fathoms at one cable south of the rock.

Black rock, situated on the north shore of Squally channel at 2 cables from the south-west extreme of Gil island (Blackrock point), the turning point into Lewis passage, covers at high water, is small, and nearly steep-to.

Soundings.—The depths in Squally channel are from 15 fathoms to no bottom at 40 fathoms. The south side of Squally channel has no known danger beyond one cable from the shore.

Weather.—Violent squalls will often be experienced in Squally channel, descending from the high land of Campania island, when calms or light winds and smooth water will be found in Whale channel.

LEWIS PASSAGE, between Gil and Fin islands, takes a northerly direction for 4 miles, thence a north-west direction for 4 miles into Wright sound, with an average width of 1¼ miles.

The eastern shore of Lewis passage has no known danger beyond half a cable from the shore.

FIN ISLAND, 2 miles westward of Gil island, is 4 miles long in a north and south direction, with an average breadth of 1½ miles. Plover point, the north extreme of Fin island, has a deep bay close southward of it, with several islets lying off the entrance to the bay, which dries throughout at low water. Four bare rocky islets fringe the north shore of Fin island, at the distance of one cable.

Fin rock, awash at high water, lies on the western shore of the channel, 2 cables from the south extreme of Fin island.

CRIDGE PASSAGE, between Fin and Farrant islands, is 3 miles long in an E.N.E. and W.S.W. direction, and one mile wide There is no bottom at 40 fathoms in mid-channel in Cridge passage.

FARRANT ISLAND, at the south-east entrance of Grenville channel, is 9 miles long in a W.N.W. and E.S.E. direction, and from 4 to 6 miles broad. The land on the south side of Farrant island reaches an elevation of 1,700 feet.

Blossom point, the south extreme of the island, has a small islet lying close to, with a ledge extending one cable south-west from it.

Block head, the eastern extreme of Farrant island, terminates in a high, bold, white cliff. The coast between Block head and Yolk point is broken into several bays; the largest lies close under the latter point, and has two patches of rock which uncover, lying 2 cables from the shore at its entrance.

Yolk point, the north-east extreme of the island, lies 3½ miles W. by N. ½ N. from the north extreme of Gil island, and 4 miles N.W. from Block head. Yolk point is smooth, bare, and rocky, and is nearly steep-to.

Yolk point is situated in latitude 53° 22′ 30″ N., longitude 129° 21′ 15″ W.

Davenport point, the north extreme of Farrant island, is bold, and lies 3 miles W.N.W. from Yolk point.

Union Passage (Matliksimtas), between Farrant and Pitt islands, enters Grenville channel about 4 miles westward of Yolk point. This passage has not been explored.

WHALE CHANNEL, between Princess Royal and Gil islands, is 12 miles long in a general N.N.W. ½ W. and S.S.E. ½ E. direction, and from 2 to 3 miles wide. There is no known danger in this channel beyond 2 cables from the shore. There is no bottom at 40 fathoms in Whale channel.

Leading point, on the eastern shore, 5 miles southward of Holmes bay (*see* page 393), has immediately over it a conspicuous hill, of triangular shape, 700 feet high.

River bight, between Holmes bay and Leading point, is a deep indentation with a large river at its head.

Maple point, on the western shore, abreast of Holmes bay, is comparatively low, and wooded, with many maple trees growing.

At one mile south of Maple point is a sandy bay, with a conspicuous sandy beach at its head.

Shrub point, on the western shore, 5 miles southward of Maple point, is comparatively low, flat, and wooded.

Camp islet, a small, conspicuous, wooded islet, lying 2 cables from the western shore, at 9 miles southward of Maple point, is connected with the eastern shore of Gil island at low water.

South of Camp islet there is a comparatively deep bay, one mile wide at its entrance; but which at low water is blocked by a ledge of rocks which uncover.

Molly point, on the western shore, one mile south-east of Camp islet, is the turning point of Whale channel into Campania sound.

Trouble island, a small, narrow, low island, lies one cable from the eastern shore, at the south entrance to Whale channel.

Barnard cove, south-east of Trouble island, affords shelter to boats and small craft. Pass in mid-channel between Trouble island and the eastern shore of Whale channel, and anchor in 20 fathoms, mud, in the eastern part of the cove, at 2 cables from the eastern shore.

Passage island, situated at the junction of Whale channel and Campania sound, is 2 miles long in a north and south direction and one mile broad. It is wooded, the tops of the trees being about 250 feet above high water. Off the south-east side of Passage island, a group of islets, rocks, and sunken dangers extend half a mile in a south-easterly direction.

The passages east and west of Passage island are deep, and 6 cables wide. On the eastern shore of the eastern channel, several rocky islands extend from one to 2 cables from the shore, off the entrance to a bay.

ESTEVAN SOUND, between Estevan and Campania islands, is about 15 miles long in a general W.N.W. and E.S.E. direction, and from $2\frac{1}{2}$ to 5 miles wide. At the south-east entrance of the sound there are several islets, rocks, and sunken rocks, nearly in mid-channel. To a stranger, therefore, Estevan sound cannot be recommended.

If, however, circumstances should necessitate its being made use of, a course should be steered to pass three-quarters of a mile northward of South Watcher islet. Thence a general course of W.N.W., cautiously, for 15 miles, should take a vessel into Nepean sound, keeping nearer the south shore of the channel, to avoid the dangerous ledges which extend to the distance of one mile from the south side of Campania island.

CAMPANIA ISLAND is nearly 15 miles long in a W.N.W. and E.S.E. direction, and from one mile to 4 miles broad. At one mile from its eastern extreme the island has an elevation of 1,000 feet, increasing westward, until it culminates in two bare mountains, with dome-shaped summits, 2,000 feet high. These mountains are of granite formation, and furnish an excellent landmark when seen from seaward. From their summits, which are 4 and 6 miles respectively from the eastern extreme of the island, the land slopes to the westward, the western end of Campania island being, comparatively, low and wooded.

The northern shore of the island is bold, with a few rocky bays along it. The north-east extreme terminates in a high, bold, white cliff.

The southern shore is low, wooded, and broken into bays and creeks, fringed by islets, rocks awash at high water, and at low water, to the distance of one mile.

The western shore is bold, and little broken. Marble rock, a small, white rock, 6 feet above high water, lies half a mile from it.

South watcher, is a small wooded islet, 100 feet high, lying nearly in mid-channel at the eastern entrance of Estevan sound, $3\frac{2}{10}$ miles S.W. $\frac{1}{2}$ W. from Eclipse island, and $3\frac{2}{10}$ miles N.E. by E. $\frac{1}{2}$ E. from Breaker point.

The South watcher has ledges which uncover at low water, extending from it north-west and south-east to the distance of half a mile.

North watcher islet, 60 feet high, is small, wooded, and conspicuous; it lies $1\frac{8}{10}$ miles W. $\frac{3}{4}$ N. from South Watcher islet.

The North watcher has ledges which uncover, and sunken dangers surrounding it to the distance of 8 cables.

Blinder rock, over which the sea breaks occasionally, lies one mile S.W. by W. from the summit of South watcher islet, and a little more than one mile S.E. from North watcher islet.

Estevan ledge, which uncovers at low water, is one cable in extent, and lies 8 cables West from the summit of North Watcher islet.

Breaker point, the eastern extreme of Estevan island, is low and wooded; from this point the coast trends N.W. by N. for about 4 miles, and is broken into bays and creeks, with several islets and rocks lying close to the shore. Thence it trends W.N.W. for about 5 miles, at which point lie two conspicuous small islets, one cable from the shore, and then takes a W. $\frac{1}{2}$ S. direction for about 6 miles, with a deep curve to the southward, until terminating at the mouth of Otter passage.

Don ledge, which uncovers at low water, extends E.N.E. 6 cables from Breaker point.

Breaker reef consists of 3 rocks awash, surrounded by sunken rocks over which the sea nearly always breaks; the outer rock lies $2\frac{1}{2}$ miles S.W. from Breaker point, and nearly $1\frac{1}{2}$ miles from the nearest part of Estevan island.

Trap rocks, some of which are awash at high water, extend 8 cables northward from the north-west extreme of Estevan island, and thence front the western end of the island at the distance of 2 to 6 cables.

Guano rocks, on the north shore of Estevan sound, consist of a cluster of 3 white rocks, lying one mile distant from the south side of Campania island at 6 miles westward of Eclipse island. The highest rock is 30 feet above high water, and the group is surrounded by rocks awash and sunken rocks to the distance of from 5 to 7 cables.

Between Guano rocks and Eclipse island, ledges which uncover at low water extend from 5 to 6 cables from the shore.

Marble rock, half a mile westward of the west extreme of Campania island, is a bare rock 6 feet above high water, small, white, and conspicuous; it is nearly steep-to on all sides, and may be approached to half a cable.

Soundings.—The depth of 40 fathoms was obtained in Estevan sound, at 2 cables from the dangers fronting the shore of Campania island, depths of 7 and 20 fathoms were found close alongside of the rocks.

NEPEAN SOUND, between Estevan sound and Principe channel, is about 7 miles long and 4 miles wide.

Otter channel, between Pitt island and Campania island, connects Nepean sound with Squally channel, and is about 3½ miles long, and from 3½ miles at its western, to one mile wide at its eastern end. There is no known danger beyond one cable from the shore in Otter channel. The water in Otter channel is deep, there being no bottom at 40 fathoms at half a mile from the shore on both sides.

Steep point, the north-eastern entrance point of Otter channel, terminates in a high, bold, white cliff.

OTTER PASSAGE leads south-westward from Nepean sound, between Estevan and Banks islands. This passage, though nearly 1½ miles wide, is obstructed on its western shore by a group of islands, islets, and rocks (Block islets), which contract the navigable channel to barely 4 cables wide in places.

This narrow channel is rendered more dangerous by the strong tides experienced in it, the greater portion of the ebb stream finding its way out of Nepean sound by Otter passage, at the rate of more than 6 knots an hour at springs, which meeting the ocean swell at the western entrance of Otter passage, produces a most turbulent breaking sea, dangerous to small vessels.

In no case should Otter passage be attempted, except at slack water and with local knowledge.

PRINCIPE CHANNEL, between Pitt and Banks islands, is about 42 miles long in a general W.N.W. and E.S.E. direction, and from 2 to 7 miles wide. From its eastern entrance this channel takes a general N.W. by W. ½ W. direction for 18 miles, then W. by N. for 10 miles, and W. ½ N. for 14 miles to the entrance to Ogden channel.

The south shore of the channel is bold, with mountains from 1,200 to 1,700 feet rising over it.

The north shore is much broken into bays, especially about midway, in two of which, ports Stephens and Canaveral, anchorage may be found.

The mountains on Pitt island, at about 3 miles from the shore, rise to a height of 1,000 to 3,000 feet.

Vancouver says "The southern shore is nearly straight and compac
" without soundings; the northern shore is much broken, bounded by many
" rocks and islets, and affording soundings in several places. On the
" south-west side the acclivity is the greatest, but both sides of the channel
" may be considered elevated land, and are entirely covered with pine trees,
" which seemed to be produced principally from a soil of decayed vegetables
" in the chasms of the rocks."*

Deer point, at 4 miles westward of Block islets, is a small peninsula on the south shore, which when first seen appears to be an islet.

Gale point is prominent, bold, and high, and lies 5 miles north-west of Deer point. A remarkable bare mountain, 1,250 feet high, is situated close to the shore at 4 miles westward from Gale point. The coast immediately under this mountain is broken into several narrow creeks, with some small rocky islets at their mouths. With the exception of these bays the south shore of Principe channel is unbroken.

Despair point, at 11 miles westward of Gale point, is bold, and nearly steep-to.

Headwind point lies 5½ miles westward of Despair point, thence the coast is bold and unbroken.

Deadman islet, a small wooded islet, lies close to the shore off the north-west extreme of Banks island, about 15 miles westward of Headwind point.

End hill, an oval-shaped hill 450 feet high, lies close to the south shore of Principe channel at 2 miles eastward of Deadman islet.

Wolf point, the south-eastern entrance point of Principe channel, and the south point of Pitt island is high, bold, and conspicuous, with several small islets close-to.

Brodie rock, a dangerous sunken rock, lies one mile S.W. by W. ½ W. from Wolf point. Between Brodie rock and the shore the ground is foul to 2 miles westward of Wolf point. A depth of 66 fathoms was found at 2 cables south of Brodie rock.

PORT STEPHENS,† on the north shore, at about 8 miles within the eastern end of Principe channel, is 4 cables wide at its entrance, and extends in a N. by E. direction 6 cables, N.E. 6 cables, and thence in an easterly direction for 8 cables, terminating in two bays, with a large stream at the head of the southern bay.

* Vancouver's Voyages, Vol. ii., p. 322.

† *See* Admiralty plan:—Port Stephens, on sheet No. 2,189; scale, $m = 3 \cdot 25$ inches

Guide islet, a small bare islet, lies one mile eastward of the port, with two small islets (the Sisters) lying nearly midway between it and port Stephens.

Directions.—Keep mid-way between the entrance points (Bluff and Centre points), and steer N. by E. for half a mile; thence N.E. for half a mile, keeping mid-channel. Haul gradually to the eastward as the harbour opens out, and anchor in mid-channel in about 12 fathoms, with Bluff point shut in with the south shore, the latter distant 2 cables.

Tides.—It is high water, full and change, at port Stephens at 0h. 30m.; springs rise 18 feet.

Bluff point, 8 miles N.W. by W. ¾ W. from Wolf point, forms the western entrance point of port Stephens and terminates in a high white cliff.

Oar point lies 6 miles W.N.W. from Bluff point, the coast between those points being bold and unbroken. Immediately westward of Oar point, the coast recedes northward, terminating in two narrow arms (Mink Trap bay).

Canoe islet, a small bare islet, not unlike a canoe in appearance, when first seen, lies off the mouth of Mink Trap bay, at one mile N.W. by W. ½ W. from Oar point.

Green top islet, three-quarters of a mile N.W. by W. ½ W., from Canoe islet, is small, with a patch of grass and shrub on its summit.

MINK TRAP BAY, situated on the north shore, about 8 miles westward of port Stephens, consists of two long narrow creeks, separated by a peninsula; this bay has deep water in it, but it is useless as an anchorage for other than small vessels and boats.

At the head of the eastern arm is an Indian village, to which a tribe of the Kit kat lah Indians resort in summer for salmon fishing.

Anger island, on the north shore, 5 miles westward of Oar point, is about 4 miles long and 2 miles broad, with shoals extending from its south and east sides 5 to 7 cables. Near its western end the island reaches an elevation of 730 feet.

Trade and Storm islands are clusters of islets which extend from 5 cables to 1½ miles from the south and eastern shores of Anger island.

Wheeler islet is a small wooded islet, distant 5 miles W. ½ N. from Foul point, the western extreme of Anger island.

Cliff islets extend north-east of Wheeler islet to the entrance of Petrel channel. These islets are bare and rocky, with foul ground between them and the shore of McCauley island.

McCauley island, on the north shore, is 17 miles long, 9 miles broad, and wooded nearly throughout. The island near its centre rises to the height of 1,160 feet. Almost midway, on its south side, a bare hill with a flat top, 400 feet high, lies close to the shore.

PORT CANAVERAL,* near the south-east extreme of McCauley island, about 21 miles westward of port Stephen, is an inlet trending to the north-east for about three-quarters of a mile with an average breadth of about 3 cables, and depths of 6 to 18 fathoms over it.

Dixon island lies on the western side of the port, with several islands and islets lying off its south and eastern sides to the distance of 2 cables.

Squall point, the south-east entrance point of port Canaveral, is the termination of the spur from Hat hill, and is bold and conspicuous.

Red point, on the north shore, opposite Squall point, has a cliff of red-brown colour over it.

Alarm rock, with 8 and 10 fathoms close-to, is a dangerous sunken rock lying nearly in mid-channel at the entrance to port Canaveral, at 1½ cables W.N.W. from Squall point, and 2½ cables from Red point.

Harbour bank, with 6 fathoms over it (probably less), lies 1½ cables north-eastward from Alarm rock, and midway between Squall and Red points.

Clown rock, on the western shore, is the outer danger extending south-east of Dixon island. This rock, which dries 3 feet, lies 2¾ cables S.E. by E. from Tonkin point, the south extreme of Dixon island, with foul ground between it and the shore.

Stephen rock, 3 feet above high water, lies on the western shore at 1½ cables from Dixon island. The outer portion of Stephen rock, which uncovers at low water, lies 2 cables S.E. ½ E. from Dimple point, the north-east extreme of Dixon island.

Directions.—Entering port Canaveral, Dimple point may be steered for when in line with Stephen rock, bearing N.W. ¾ N., until Bush islet (off south-west extreme of Dixon island) is just shut in with Tonkin point bearing W.S.W. The latter mark kept on astern will lead to the anchorage ground, when anchor in 14 to 15 fathoms, sandy bottom, at 1½ cables south-east of the north entrance point (Red point).

Tides.—It is high water, full and change, in port Canaveral at 0h. 30 m.; springs rise 18 feet.

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* *See* Admiralty plan:—Port Canaveral, on sheet No. 2,189; scale, $m = 3{\cdot}25$ inches.

Anchorage was obtained by Vancouver, on two occasions, on the north shore, westward of port Canaveral, at 3 cables from the shore, in 34 and 35 fathoms, respectively. The exact positions are not recorded.

Bush and Dark islets are small, wooded islets, which lie close to the south shore of McCauley island, off the entrance to port Canaveral, at 2 miles westward of Wheeler islet.

Petrel channel is an unexamined passage between Pitt and McCauley islands; its southern entrance is about 3 miles wide, thence the channel takes a north-west direction for nearly 8 miles, when it divides, one passage going northward, the other southward of Lofty island, and again joining at 2 miles eastward of Ogden channel.

Lofty island has not been surveyed in detail, but it is about 8 miles long and 2¾ miles wide near its south-east end, gradually narrowing to the north-westward; near the south shore Noble mountain rises to a height of 2,874 feet.

Hankin ledges consist of rocks awash, and sunken dangers, which extend nearly one mile from Hankin point (south-west extreme of McCauley island).

Directions.—A mid-channel course should be kept when navigating Principe channel, until nearing Anger island, when the south shore should be closed to avoid the dangers which extend off that island.

Soundings.—The depths in Principe channel are from 66 fathoms, sand, to 140 fathoms, rock.

Tides.—The flood tide setting to the north-west, approaches principally by Estevan sound, being joined in Nepean sound by the stream which enters through Otter passage. At the western end of Principe channel this stream is met by the flood which has passed up outside Banks island. The ebb stream runs out principally by the Otter passage. Both streams attain a velocity of 3 knots an hour at springs.

CHAPTER XIII.

OUTER COAST.—CAPE CALVERT TO OGDEN CHANNEL.

VARIATION in 1888.

Cape Calvert, 24° 50′ E. | Ogden Channel, 26° 30′ E.

CALVERT ISLAND,* the southern island at the entrance to Fitzhugh sound, is 13 miles long N.W. and S.E., and 8 miles across at its broadest part. The southern and western shores of Calvert island are but little broken, comparatively low, and thickly wooded.

Sorrow island, situated at the pitch of cape Calvert, the south extreme of Calvert island (*see* page 358), is conspicuous (and an excellent thick-weather mark) from its cliffy formation, and by being covered with stunted, weather-beaten trees.

Mark nipple, an isolated hill, 350 feet high, at the south-west extreme of Calvert island, is a very useful landmark when approaching Fitzhugh sound.

Landing, with fine weather and off-shore winds, may be effected in Grief bay (north of Sorrow island) and in other bights westward to Herbert point the S.W. extreme of the island, about 8 miles distant.

Hedley patch, with 9 fathoms on it, and probably shoaler, is of small extent, and lies 3¼ miles S.E. ¼ E. from Blakeney island, and 5½ miles W. ½ S. from south point of Sorrow island; at nearly half a mile north-east from it there is a depth of 19 fathoms.

Blakeney islet, 150 feet high, half a mile from the south-west extreme of Calvert island, is small, wooded, and about half a mile long.

Fitz Roy reef, the most outlying danger off the western shore of Calvert island, uncovers at low water, dries one foot, and is about half a mile in extent in an east and west direction. Its outer or western edge lies 1½ miles W. by N. from Blakeney island, and 1½ miles from the nearest shore of Calvert island.

Carrington reefs are a cluster of sunken rocks, the outer edge of which lies half a mile from the western shore of Calvert island, at 1¾ miles N.N.W. ¾ W. from Blakeney island.

* *See* Admiralty chart:—Cape Caution to port Simpson, No. 1,923 b; scale, $m = 0{\cdot}25$ of an inch; also No. 1,923 a; scale, $m = 0{\cdot}25$ of an inch.

The coast of Calvert island, northward of the Carrington reefs, is foul to the distance of 5 cables.

Kwakshua is an unexamined channel lying between Calvert and Hecate islands. At its western entrance this passage is half a mile wide, and takes a north-easterly direction. (*See* page 361.)

Kwakshua rock lies nearly in mid-channel, at the western-entrance of Kwakshua channel. The sea only breaks at intervals over this dangerous sunken rock.

Hecate reefs fringe the western shore of Hecate island to the distance of 8 cables.

HAKAI CHANNEL between Hecate and Nalau islands, is about 7 miles long in a general N.E. ½ N. and S.W. ½ S. direction, and from one to 1½ miles wide. (*See* page 361.)

Sugar loaf hill, on the western side of Hecate island, is 500 feet high.

Leading peak, about 1½ miles southward of Sugar-loaf hill, is of triangular shape, with a sharp, well defined summit.

South pointers are a cluster of bare black rocks, of small extent, 2 feet above high water, surrounded by sunken dangers to the distance of 2 cables; they lie on the south shore, at the western entrance of Hakai channel, 1½ miles westward of the Starfish group.

North pointers are a cluster of bare rocks, of light colour, lying on the north shore at the western entrance of Hakai channel. The western or outer rock lies 2½ miles N.N.W. from South pointer rocks.

Starfish group, wooded, from 70 to 150 feet high, lie on the south shore, and extend about 1½ miles in a north-east and south-west direction. The group consists of three principal islands, much broken into long, rocky, narrow creeks with shores of white cliffs.

Starfish ledge, over which the sea usually breaks, lies 2 cables from the north-west shore of Long island, the northernmost of the Starfish group.

Breaker group, situated on the north shore in the middle of Hakai channel, is about one mile in extent, the larger islands being wooded, about 250 feet high, and the smaller bare.

Breaker ledge uncovers at half ebb, and lies half a mile south-east from the centre island of the Breaker group.

East rock, situated on the south shore, off the entrance to Welcome harbour, is awash at low water, and lies half a mile off shore, N. by E. from the western entrance point, and half a mile N.W. by N. from the eastern entrance point of that harbour.

There are depths of 23 and 25 fathoms close to East rock, and 30 fathoms between that rock and Port reef.

Port reef, awash at high water, lies 2 cables E. ¼ S. from East rock.

Clearing marks.—Leading peak (head of Welcome harbour) seen in line with Bluff point (north side of Welcome harbour) bearing S. by E. ¾ E. will lead westward; and South pointers rocks bearing S.S.W. will lead northward of these rocks.

Choked passage lies southward of the Starfish group; it is obstructed by rocks awash, reefs, and sandbanks.

WELCOME HARBOUR,* situated on the south shore of Hakai channel near its western end, is 3 cables wide at its entrance, and 1½ miles long in a S.S.E. direction. Though somewhat confined, it affords good shelter to small vessels, and within the harbour, on the north shore, there is a sandy beach where a vessel might be beached. Strong westerly winds send a swell into this harbour.

Fairway rock, with 24 feet water over it, lies nearly in mid-channel at the entrance to Welcome harbour. There is a depth of 20 fathoms close westward, and of 9 fathoms close eastward of the rock.

Leading peak seen just northward of Bluff point bearing S. by E. ¾ E. will lead eastward; and Sugar Loaf hill, seen in line with Leading island (a small, round, wooded island within the harbour), will lead close westward of Fairway rock.

Harbour ledge, situated one cable from the western shore of Harbour island, is of small extent, and dries 3 feet at low water.

Codfish rock, with 12 feet water over it, lies 100 yards off the south shore of Harbour island.

Wolf rock, awash at high water, lies close to the east shore, at nearly 2 cables northward of Sandspit point.

Sandspit point has a sandspit extending one cable from it.

Directions.—Having passed not less than half a mile northward of Starfish group, the leading mark before given for clearing East rock should be brought on and steered for. Especial care will be necessary if the flood stream be making.

Having cleared East rock, pass east or west of Fairway rock† as requisite, and anchor in 7 to 9 fathoms in mid-channel between Leading island and Wolf rock, with the former bearing W.N.W. distant one cable.

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* *See* plan:—Welcome harbour, on Admiralty chart No. 1,462; scale, $m = 4{\cdot}0$ inches.

† Fairway rock is marked by kelp during the summer months.

Exposed bay situated just eastward of Welcome harbour, has a dangerous cluster of sunken rocks near the middle of the bay.

Soundings.—At 2 miles south-west of North Pointer rocks there is a depth of 65 fathoms, sand. Approaching Hakai channel from that position the water will shoal to 40 fathoms, but will deepen to over 100 fathoms when within the channel eastward of a line joining North and South Pointers rocks. There are depths of 125 and 104 fathoms eastward of that line.

Tides.—It is high water, full and change, in Welcome harbour at 12h. 0m.; springs rise from 15 to 16 feet, neaps 12 to 13 feet.

The flood sets to the north-eastward. Both streams attain a velocity of 4 knots an hour at springs.

Directions.—Hakai channel is not recommended to a stranger. If using it, steer midway between North and South Pointers rocks, and thence a mid-channel course (N.E. ¼ N.) towards a conspicuous mountain on the eastern shore of Fitzhugh sound, which will lead through into that sound.

NALAU PASSAGE between the Nalau group and Hunter island, is obstructed by islands, islets, rocks awash, and sunken dangers, and is useless for navigation. (*See* page 362.)

White Cliff island, situated 4 miles W. by N. ½ N., from the western or outer North Pointer rock, is of small extent, bare, and 250 feet in height; it shores consisting of high white cliffs, render it conspicuous when seen from the south and west.

A reef, on which the sea breaks at low-water, lies midway between White Cliff island and the North pointers.

QUEEN'S SOUND, situated between Goose and Hunter islands, is about 12 miles long in a N. by E. and S. by W. direction, and from 4 to 8 miles wide. At its northern end is a mass of islands and islets, which render that portion of the sound intricate and dangerous.

Soundings.—At the entrance to Queen's sound there are depths of 73 and 76 fathoms, sandy bottom; and within the sound no bottom could be found at 40 fathoms at one mile from the shore.

Spider island, 250 feet high, situated on the eastern shore, at the entrance to Queen's sound, 3 miles northward of White Cliff island, is 3½ miles long, in a N.N.W. and S.S.E. direction, and 1½ miles broad; it is connected with Hunter island by a ledge of rocks awash, through which there are boat passages, and its north-west extreme terminates in high, bold, white cliffs. The shores of Spider island are broken into numerous narrow rocky creeks.

Superstition point on the eastern shore of Queen's sound, 2 miles northward of Spider island, is the south-west extreme of a small island, which is connected with Hunter island by a narrow neck, awash at high water.

Superstition ledge consists of high rocks, connected by rocks awash and sunken dangers, the outer extreme of which lies S.W., distant 1¼ miles from Superstition point. Strong tide races will be met with in the vicinity of this ledge, and the sea breaks upon it heavily at times.

Purple bluff, the south-west extreme of a group of islands, on the eastern shore of Queen's sound, at the entrance to Plumper channel, terminates in high, bold, basaltic cliffs of a purple tint. The group consists of numerous islands, islets (wooded and bare), rocks awash, and sunken rocks, extending over a space of nearly 5 miles.

Purple bluff lies 5 miles north-west of Spider island, and 5 miles from the Goose island group.

GOOSE ISLANDS, on the western shore of Queen's sound, consist of four principal islands, connected at low water, the largest and northernmost being about 200 feet high, and wooded; its north-east extreme terminates in conspicuous, high, white cliffs.

Yellocki, an Indian fishing village, is situated on the eastern side of the westernmost Goose island.

Gosling rocks consist of numerous rocks, awash at high water, and sunken dangers, the outer extreme of which lies nearly 4 miles S.S.E. from the southernmost Goose island.

West rock, awash at high water, lies one mile south-west of the westernmost Goose island.

PLUMPER CHANNEL, between Hunter and Campbell islands leads from Queen's sound into Lama passage; its southern end is obstructed by numerous islets and rocks, and no specific directions can be given for entering it.

As a general guide, however, if the conspicuous white cliff on the north-easternmost Goose island be kept bearing S.W. astern, it will lead towards the entrance to Safe passage.

HECATE CHANNEL, between Campbell island and the Bardswell group, leads from Queen's sound into Seaforth channel, and is also obstructed at its southern end by numerous islets and rocks. The two principal passages are Codfish passage and Brown narrows; no directions, however, can be given for entering them, and the remarks concerning Plumper channel apply also to Hecate channel.

BROKEN GROUP (Qual a qute), situated 2 miles northward of the Goose island group, extend 2 miles in a N.N.W. and S.S.E. direction,

and consist of several islets and rocks, connected throughout by ledges which uncover at low water.

Fingal island is a small, wooded island, lying one mile W. by N. from the northernmost island of the Broken group.

Fingal ledges extend one mile in a southerly direction from Fingal island, and consist of rocks awash, and ledges which uncover at low water.

Peveril rock lies $1\frac{1}{2}$ miles N.N.E. from the northernmost Goose island, and is awash at high water.

Middle rock, 6 feet high, lies 3 miles N.W. by W. $\frac{1}{2}$ W from the north-west extreme of North Goose island, and $2\frac{1}{2}$ miles W. by S. from the south island of the Breaker group. There is a depth of 29 fathoms, rock, at half a mile southward of the rock.

North breaker, a dangerous sunken rock, lies one mile N.N.W. from Middle rock. There is a depth of 27 fathoms, rock, at one mile westward of the North breaker.

Limit island is a small wooded island, with foul ground extending half a mile south-west from it.

Rempstone rocks consist of two patches awash at high water, one mile apart, lying E. by S. and W. by N. from each other. The western or outer rock lies $1\frac{3}{10}$ miles S.S.E. $\frac{1}{2}$ E. from cape Swain.

BARDSWELL GROUP, forming the eastern side of Milbank sound, consist of low, wooded islands, extending over a space of 7 miles square, the largest of which, Dufferin island, forms the west shore of Hecate channel. Among the group are several boat channels, communicating between Milbank sound, and Seaforth and Hecate channels.

ARISTAZABLE ISLAND, situated on the western shore of Laredo sound, is about 26 miles long in a N.W and S.E. direction, and is from one to 10 miles broad, and wooded. At about 8 miles from its south-east extreme there is a conspicuous saddle-shaped hill 640 feet high. Near the western end of the island, over the north shore, a bare ridge of hills, with four conspicuous peaks, rises to the height of 950 feet.

Over the south extreme of the island there are some bare hills 350 feet high, and at the extreme western end of the island there is a remarkable boulder or nob lying on the summit of a bare hill. The southern shores are broken into bays and creeks, obstructed by islets and sunken rocks; and there are several off-lying groups of islands.

Entrance island, situated $1\frac{1}{2}$ miles southward of the south-east extreme of Aristazable island, and 16 miles W. by N. $\frac{1}{4}$ N., from Outer island (entrance to Milbank sound), has a small islet lying close south of it, and

is the outer island of a group which extends from the south-east point of Aristazable island. The larger islets of the group are wooded, the smaller bare.

White rock, 100 feet high, bare and conspicuous, situated 5 miles N.W. by W. ¾ W. from Entrance island, is the outer rock of a group extending 2 miles from the shore of Aristazable island.

Sentinel island, 250 feet high, small, round, wooded, and conspicuous, lies off the south point of Aristazable island, at 1½ miles from the shore, at 4 miles W. ½ N. from White rock. Between Sentinel island and the nearest island of the group east of it, distant 5 cables, there is no bottom at a depth of 40 fathoms.

Several rocks awash and sunken rocks lie northward of Sentinel island, fringing the south shore of Aristazable island.

The two most outlying rocks, which are from one to 2 feet above high water, lie respectively one mile W. by N. and 4½ miles W.N.W. from Sentinel island.

GANDER ISLANDS (Cha che kwas) are a group of islands, islets, and rocks, extending over a space 11 miles long in a N.N.W. and S.S.E. direction, and 4 miles broad, at about 6 miles from the south shore of Aristazable island. The larger islands of the group are wooded, the smaller ones bare, and the tops of the trees are from 70 to 150 feet above high water.

Large Gander island, the northernmost and largest of the group, is about 2 miles long in a N.N.W. and S.S.E. direction, and half a mile broad.

Middle Gander islands are two small, wooded islands, lying close together, the northern island 5 miles S.S.E. from the south extreme of the Large Gander island. A bare rock, with sunken rocks surrounding it, lies N.W. by N. distant 2 miles from the Middle Gander islands.

South Gander island lies one mile S.S.E. from the Middle Gander islands, is 4½ cables long in a N.N.W. and S.S.E. direction, is half a cable broad, 70 feet high, and wooded.

South-east Gander islands are two small wooded islands 100 feet high, lying close together, 3 miles S.E. by E. from South Gander island. Two small, bare, rocky islets lie 1½ miles north-west of South-east Gander islands.

Goose ledge, which uncovers at low water, lies 3 miles S. by W. ½ W. from South-east Gander islands, and 3 miles S.F. ½ E. from South Gander island.

Sparrowhawk breakers* lie, respectively, 4 and 6½ miles S. by E. from South-east Gander islands. There is a depth of 21 fathoms between these dangers.

Tide rip islands consist of two groups lying N.N.W. and S.S.E. distant 2 miles from each other; the southern group lying 2 miles north of the Gander group. These islands, which extend over a space of about 12 miles in a N.N.W. and S.S.E. direction, are wooded, and about 200 feet high; the northern and largest island terminating at its north-west extreme, in high, white conspicuous cliffs, 2½ miles to the westward of Devils point, the north-west point of Aristazable island.

Tides.—The flood sets to the northward, both flood and ebb streams attaining at springs, among these islands, a rate of 4 knots an hour.

Soundings.—Westward of Laredo sound, no soundings have been taken beyond the distance of one mile from the south shore of Aristazable island. The depths obtained at that distance were 23 fathoms, and no bottom at 40 fathoms.

Caution.—As an extended examination has not been made of the Gander and Tide rip groups and their vicinity, and the tides being strong, the channels between them, though deep, should not be attempted by a stranger. When approaching these groups of islands, the lead and look-out should be attended to.

ESTEVAN ISLAND, situated 6 miles westward of the Tide rip group, is about 14 miles long in a general W. by N. and E. by S. direction, and from 2 to 5 miles broad; the southern shores being comparatively low, wooded, and much broken into bays and creeks. Near the centre, on the north shore, the land attains an elevation of 1,500 to 1,700 feet, forming a saddle-shaped mountain with the highest part to the westward.

Haycock island, small, bare, and 60 feet high, lies 4½ miles S.E. ½ E. from Curtis point, and 7 miles W. by S. ¾ S. from Breaker point, the eastern extreme of Estevan island. (*See* page 449.)

Haycock rocks are three rocks awash, which lie respectively W. by S., S. by E., and N. by E. distant one mile from Haycock island.

The passage between Haycock island and Estevan island should not be attempted.

Curtis point, on the south shore of Estevan island, 4½ miles N.W. ½W. from the summit of Haycock island, is low and wooded, with some rocky islets close to.

* H.M.S. *Sparrowhawk* passed between and reported these breakers in 1869.

Curtis rock, a dangerous sunken rock, over which the sea breaks occasionally, lies one mile S.S.W. from Curtis point.

Cox point, the west extreme of Estevan island, lies 5 miles N.W. ¼ W. from Curtis point. With the exception of a small bay at one mile westward of the latter point, the shore between Curtis and Cox points is but little broken.

Marchant rock, over which the sea breaks at low water, lies 2 miles South from Cox point, and 1¾ miles from the nearest shore of Estevan island.

Cone islet, small, wooded, 250 feet high, and conical, is the southernmost of the Block islets, and lies at the southern entrance of Otter passage, and on the west side of that channel, at 2 miles from the shore of Banks island.

Breaker islets, which lie off the eastern end of Banks island, at one mile westward of Cone islet, consist of a group of islets and rocks awash, the highest islet being about 70 feet high and wooded.

BANKS ISLAND, the south extreme of which lies 2 miles westward of Estevan island, is about 41 miles long, in a general W. by N. and E. by S. direction, and from 5 to 10 miles broad. The southern shore is wooded and comparatively low, seldom exceeding 150 feet in height, and is broken into bays and creeks, rendered useless as anchorages by numerous rocks awash, and sunken dangers.

The northern shore is high and bold, with a mountain range of 1,000 to 1,760 feet over it, the latter elevation being attained near the northern shore, or about midway between the east and west extremes of the island. At about 10 miles from the western end of Banks island the land becomes low and flat, and is intersected by many creeks.

Calamity bay, at the eastern extreme of Banks island, is 3 miles wide at its entrance, and extends 3 miles in a north-westerly direction; it consists of iron-bound shores, with rocky islets and sunken dangers occupying the bay nearly throughout.

Terror point, the south-east extreme of Banks island, is high and bold, 200 feet above high water. From its outer extreme this point slopes inland, and when first seen appears as an island.

Terror rocks consist of rocks awash and sunken rocks, over which the sea breaks heavily, extending one mile south-eastward from Terror point.

Shrub islet, of small extent, 80 feet high, with a conspicuous patch of bush upon its summit, lies 3 miles S.W. ½ W. from Terror point, and has sunken rocks surrounding it to the distance of 3 cables.

Grief point, situated N.W. by W. ½ W., 8 miles from Terror point, is low and wooded. A ledge, consisting of rocks awash and sunken dangers, extends 1½ miles south-west from Grief point.

The coast between Terror and Grief points has foul ground extending off it to the distance of one mile.

Foul bay, between Grief and Wreck points, is 5 miles wide, and 2 miles deep; it is, however, useless as an anchorage, being obstructed by islets, rocks, and sunken dangers.

Wreck point, a conspicuous projection, is low and wooded, lying 5 miles W. by N. ½ N. from Grief point.

Junk ledge, consisting of rocks awash, and ledges which uncover at low water, extends nearly 2 miles south-east from Wreck point.

North Danger rocks, 7 miles southward of Wreck point, are a dangerous cluster of five bare rocks of small extent, 10 feet above high water, and surrounded by rocks awash and sunken rocks to the distance of half a mile.

The centre of the cluster lies 18 miles S.E. by E. ½ E. from the summit of Bonila island. Vessels should keep southward of the line joining Shrub islet and North Danger rocks, and not pass between those dangers and Banks island.

Kelp point lies 8 miles W. by N. ½ N. from Wreck point.

Kelp ledge extends 1½ miles south-eastward from Kelp point. Between Wreck and Kelp points the shore of Banks island is foul to the distance of one mile.

Halibut rocks consist of two dangerous clusters (covered at high water) about half a mile each in extent, lying W.N.W. and E.S.E., distant 1½ miles from each other. The centre of the eastern cluster lies 8 miles E. by S. ¾ S. from the summit of Bonila island, and 4¾ miles S.E. by S. from Cliff point.

Cliff point, 6 miles W. ¾ N. from Kelp point, terminates in high, bold, white cliffs. Three small rocky islets lie near the shore close eastward of the point.

South rocks, lying to the southward of Bonila island, consist of two clusters of rocks awash at high water, of small extent, lying S.S.E. and N.N.W., distant one mile from each other. The south or outer group, over which the sea usually breaks heavily, lies 3$\frac{4}{10}$ miles S.S.E. from the summit of Bonila island.

High-water rocks, lying nearly midway between Bonila island and Cliff point, consist of six rocks, awash at high water, about 2 cables in extent, at 2½ miles E. ½ S. from the summit of Bonila island.

BONILA ISLAND, situated 9 miles S.S.E. from the north-west point of Banks island, and 4 miles from the south shore of the island, forms an excellent landmark. The island is about 2 miles long, in an east and west direction, and one mile broad, having on its eastern shore two small bays, with some rocky islets lying off them at 2 cables from the shore. Near the centre the island reaches an elevation of 550 feet, the summit being dome-shaped, falling almost perpendicularly on its north and south sides, but sloping gradually to the westward. During the summer months, the sides of Bonila peak are clothed with purple-tinted heather.

The summit of Bonila island is situated in latitude 53° 28′ 40″ N., longitude 130° 35′ 15″ W.

Landing may be effected at the head of the southern small bay on the eastern side of Bonila island.

North-west rocks are a cluster, half a mile in extent, lying 2 miles N.W. by W. from the summit of Bonila island; the highest rock is 3 feet above high water.

North rocks, a cluster, about half a mile in extent, and awash at high water, lie 1½ miles E.N.E. from the centre of North-west rocks, and 2 miles N.N.W. from the summit of Bonila island.

Middle rocks, two clusters, awash at low water, lie respectively 1½ miles W.N.W. and 2 miles N.N.E. from the summit of Bonila island.

White rocks lie close to the shore at the western extreme of Banks island: the two largest rocks are about 30 feet above high water, bare and conspicuous, with several smaller rocks surrounding them, and they form an excellent landmark when making Ogden channel from Hecate strait.

The coast between White rocks and Cliff point, and between those rocks and Deadman islet, is much broken, with several creeks running inland.

Anchorage for small craft in fine weather is stated to be obtainable close northward of White rocks at the mouth of a creek.*

Supplies.—Game abounds on all the off-lying islands. Notwithstanding the presence of wolves, deer are in great numbers, especially on the southern shores, which appear to be their favourite resort. Water is plentiful at all seasons, the source apparently being springs. Trout may be procured in the streams.

Berries, especially the whortleberry, cranberry, and wild raspberry, were found in abundance during July and August (1869).

Cedar and pitch pine are the principal woods met with.

* There is also anchorage reported to exist generally off the north-west coast of Banks island.—Commander G. E. Nicolls, R.N., H.M.S. *Cormorant*, 1887.

Soundings.—On the seaboard, between Calvert island and Milbank sound, at the distance of 4 to 5 miles from the shore, the depths are from 53 to over 100 fathoms.

At a distance of 5 miles westward from Blakeney island there is a depth of 54 fathoms, reddish sand, deepening to 76 and 89 fathoms, fine brown sand, to abreast Hakai channel.

At 2 miles southward from White Cliff island, there is depth of 70 fathoms, sand. Proceeding westward from that position across the mouth of Queen's sound, the depths are from 70 to 76 fathoms, sand; there being a depth of 72 fathoms, mud and sand, at 7 miles southward of the Goose island group. From the latter position, proceeding in a north-westerly direction, passing 5 miles westward of the Goose island group, the water deepens to 78 and 80 fathoms, mud and sand, with occasionally shells and stones.

With cape Swain bearing N.N.E., distant 4 miles, the water deepens quickly to 105 and 109 fathoms, rock, off the entrance to Milbank sound.

Browning entrance is the approach common to the south end of Ogden channel and the west end of Principe channel. It is included between the south side of Goschen island and the north-west extreme of Banks island, and between cape George and White rocks is 14 miles wide.

OGDEN CHANNEL,* situated between Pitt and Porcher islands, is about 16 miles long, and from 4 cables to 1½ miles wide, and affords the shortest means of communication between Queen Charlotte islands (Skidegate) and the inner waters. At its southern end, Ogden channel is divided by Spicer island into two passages (Schooner and Beaver passages); and at one mile northward of Spicer island, the channel is obstructed by a group of islands (Channel islands) which reduce the navigable channel to 4 cables wide.

The water, however, in the Ogden channel is deep; and the dangers, with one exception, are visible except at high water.

Landmarks.—On Dolphin island a mountain with an irregular broken summit rises to the height of 1,400 feet. South-east of that mountain, and close to the shore, is False cone hill,—a hill with a conical summit. Off the south shore of Dolphin island in the vicinity of False cone hill, are two small islets, the western of which lies close to the shore and is bare; Sentinel island, the eastern islet, lies about one mile distant from the shore, is wooded and about 100 feet high.

On the eastern side of Dolphin island, close to the shore, Passage cone, a hill with a conical summit, rises to the height of 454 feet, and is a useful mark for indicating Schooner passage. On the north-west side of Spicer island a saddle-shaped hill rises to the height of 300 feet.

* *See* Admiralty chart:—Ogden channel and adjacent anchorages, No. 1,901; scale, *m* = 1 inch.

Northward of the Channel group of islands, the land becomes higher.

On the eastern shore, close northward of Alpha bay, Anchor mountain, a conical mountain, rises to the height of 1,931 feet. At one mile south of Alpha bay, there is a remarkable white patch on the rocky eastern shore.

On the western shore, abreast of Alpha bay, an extensive valley extends inland. At 3 miles northward of the valley is a mountain 1,645 feet high, on the sides of which are several landslips.

Peninsula point, the north-west entrance point of Ogden channel, is prominent, with a hill near its eastern extreme. Northward of the point, at the mouth of the river Oona, is Oona bay, about half a mile wide, and one mile deep in a westerly direction.*

There is said to be anchorage in 8 or 10 fathoms water on the north side of Peninsula point, near the mouth of the river Oona.

Long island consists of two low wooded islets, lying close together at 1½ miles southward of Spicer island.

Channel island is a small wooded islet, lying nearly midway between Long and Spicer islands.

SPICER ISLAND, situated between McCauley and Dolphin islands, is of triangular shape, the base being to the north, and 2½ miles long. The island near its centre attains an elevation of 827 feet. On its south-east side two small narrow bays indent the shore in a north-westerly direction; and off its south-west side, at half a mile from the shore, are Christie islands, a cluster of islets and rocks, some wooded and others bare.

Channel group lies on the western shore, at one mile northward of Spicer island. The large islands are wooded, and the eastern islet of the group is small, bare, and conspicuous. Half-a-mile northward of the Channel group are some small islets, one bare (White rock), and another covered with vegetation (False grassy islet).

South Twin islet is a small wooded islet on the eastern shore, half a mile from the eastern islet of the Channel group and one mile northward of Spicer island. This islet, and the eastern bare islet of the Channel group, indicate the navigable channel, which lies between them.

* In this vicinity the surface water changes to dirty white, apparently coming from the river Skeena through port Essington, and probably derived from glaciers at the head waters.

North Twin islet resembles South Twin islet from which it lies N.N.W. distant half a mile. The tops of the trees on North Twin islet are about 130 feet high. Several small islets lie between the North and South Twins and McCauley island.

BEAVER PASSAGE,* between McCauley and Spicer islands, is the wider and better of the two passages leading into Ogden channel.

At its western entrance Beaver passage is about half a mile wide, and takes a N.N.E. $\frac{3}{4}$ E direction for about $4\frac{1}{2}$ miles, thence turning sharply to the N.W. by W., towards the Channel group, for $2\frac{1}{2}$ miles.

North rock is always visible, and lies nearly in mid-channel at the southern entrance of Beaver passage, half a mile south-east from Long island.

Connis rocks lie on the western shore (marked by kelp in the season) 3 cables from the north-east extreme of Spicer island. The outer of these rocks only covers at high water.

On the eastern shore, abreast Connis rocks, is a small bare islet off a sandy bay.

Soundings.—There is a depth of 42 fathoms, rock and shell, at the western entrance of Beaver passage, and no bottom at 20 fathoms within the channel.

Directions.—Having passed through in mid-channel between Long island and North rock, steer N.N.E. $\frac{3}{4}$ E. for about $4\frac{1}{2}$ miles; thence N.W. by W. for about $1\frac{1}{2}$ miles, and pass midway between South Twin islet and the Eastern (bare) islet of the Channel group; taking care not to shut in the west point of Channel island, with the south-east extreme of Spicer island, until the Bare islet (channel group) bears N.W. by W. to clear Connis rock. The east side of Long island touching the west side of Channel island bearing S.S.W. $\frac{3}{4}$ W. also leads eastward of Connis rock.

Northward of the Channel group Ogden channel widens to nearly 2 miles. The shore on both sides has no known danger beyond 2 cables from it.

SCHOONER PASSAGE, between Spicer and Dolphin islands, is barely 2 cables wide in its narrowest part, and is about 3 miles long in a general north and south direction, with depths of 20 fathoms, to no bottom at 33 fathoms.

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* H.M.S. *Scout*, when proceeding through Ogden channel anchored off the north side of Dolphin island, abreast Kit kat lah village (in latitude 53° 48′ N., longitude 130° 26′ 30″ W.), in 11 fathoms, mud, with Village point bearing East; and a large rock 16 feet high bearing South. There is deep water half a mile north of Dolphin island, and the village is unmistakeable.—Navigating Lieutenant E. S. Clapp, R.N., 1872.

Boys rock, a dangerous sunken rock, lies at the southern end of Schooner passage, 2 cables from the south-east extreme of Dolphin island. There is a depth of 49 fathoms, rock, at 2 cables south of Boys rock.

Sentinel island bearing W. by S. will lead southward; and Passage cone hill bearing N. by W. will lead eastward of Boys rock.

Directions.—Having brought the clearing marks on for Boys rock, pass one cable westward of the two small rocky islets which lie half a mile N.N.E. of that rock. Thence mid-channel should be kept, and when abreast the north end of Spicer island, steer to pass midway between that island and the south islet of the Channel group. Pass eastward of the latter at a distance of 2 cables, and proceed as before directed for Beaver passage.

Tides.—The flood stream sets to northward, and near the north end of Ogden channel divides, one part turning to the eastward into Grenville channel, the other continuing northward towards Skeena river. The ebb stream from Grenville channel, Chatham sound, and Skeena river, unite off the north end of Ogden channel, and pass out by it. The muddy water of Skeena river is usually clearly defined against the blue water of Ogden channel.

Both flood and ebb streams, in the narrow portions of Ogden channel, attain a velocity of 4 knots an hour at springs.

An unexplored canoe passage lies between Goschen and Porcher islands; it is about 15 miles long, and leads from Ogden channel into Edye passage.

ALPHA BAY,* situated on the eastern shore, 4 miles within the north entrance of Ogden channel, faces the west, and is nearly one mile wide, but only 3 cables deep. Near its northern end a deep valley extends inland, and though it flows a fine trout stream. From the south entrance point of this stream a sandspit extends 2 cables towards the north point of Alpha bay.

Anchorage may be obtained in 10 and 11 fathoms, at $1\frac{1}{2}$ cables from the nearest shore (Fish point), with the south entrance point of the trout stream bearing N.E. distant $2\frac{1}{2}$ cables, and Anchor mountain over the north shore of the bay N.E. $\frac{1}{2}$ N.; in this position the point on the western shore under Bareside mountain should be seen in line with north point of Alpha bay, bearing N. by W. $\frac{3}{4}$ W.

Tides.—It is high water, full and change, in Alpha bay at noon; springs rise 18 to 19 feet.

* *See* Admiralty plan :—Alpha bay, on Admiralty chart, No. 1,901; scale, $m = 6{\cdot}0$ inches.

CHAPTER XIV.

PORTLAND AND OBSERVATORY INLETS AND PORTLAND CANAL.

VARIATION, 28° East in 1888.

PORTLAND INLET.*—This arm of the sea extends from the north-east part of Chatham sound in a N. by E. ½ E. direction for 10 miles, thence N. by E. for 10 miles where it divides; one arm continuing northward to the head of Observatory inlet; and the other taking a north-westerly and northerly direction to the head of Portland canal. At its southern entrance, between Wales and Maskelyne points, the inlet is about 3 miles wide, and its shores are comparatively free from danger, beyond the distance of 2 cables.†

Landmarks.—The shores of Portland inlet are high and bold, especially the eastern. Needle peak, on the south-east side of Nasoga gulf, is a remarkable mountain terminating in a sharp snow-clad pinnacle, 5,000 feet high. Northward of Nasoga gulf, the shores of Mylor peninsula are high, bold, and precipitous, rising almost perpendicularly from the sea to the height of 3,000 feet. On the western shore, Entry peak on Wales island has been already described. (*See* page 439.) The mountains on Pearse island lie in ridges nearly parallel to the shore, and the land is lower than on the eastern shore of the inlet. Northward of Lizard point the western shore becomes low and wooded, flanked by mountains 1,900 to 2,200 feet in height.

York island, half a mile N.E. from the north extreme of Wales island, lies nearly in mid-channel, between that island and Pearse island; it is small, wooded, and 100 feet high.

Abreast York island, a narrow channel leads westward communicating with Pearse channel and Portland canal, but it is obstructed by several islands and islets, which render the passage intricate.

Compton island, at the north entrance of Work channel, is of triangular shape, with a base 2 miles long to the southward, the northern

* *See* Admiralty chart:—Port Simpson to Cross sound, No. 2,431; scale, $m = 0{\cdot}15$ of an inch.

† For climate and winds, *see* pp. 5, 9.

extreme of the island terminating in a long, low point. There is a boat passage into Work channel eastward of Compton island.

Emma passage, northward of Compton island, is half a mile wide, and takes an E.S.E. direction for 3 miles, thence N.N.E. 3 miles, and terminating in a sandy bay. The depths throughout the latter arm are from 23 to 36 fathoms.

Union bay, at the head of the south-east arm, affords anchorage for small vessels in 20 fathoms, at one cable from either shore.

SOMERVILLE ISLAND, 2,000 feet high, on the eastern side of the inlet, is 8½ miles long, in a N. by E. and S. by W. direction, and 3 miles broad. The shores of this island are wooded, and bold, the land on its western side rising almost perpendicularly from the sea. The island is but little broken, except on its north side, where there is a bay, with deep water in it, half a mile wide, and one mile in extent, in a southerly direction.

Elliott point, the south extreme of Somerville island, lies 4 miles N. by E. from Maskelyne point, and $3\frac{2}{10}$ miles E. by N. ½ N. from Wales point.

Truro island, 2 cables from the south-west side of Somerville island, is about 1½ miles long, in a N. by E. and S. by W. direction, and nearly half a mile broad. The island is wooded, with bold shores, and culminates in two hills 800 feet high.

Anchorage was found by Vancouver off a small bay on the west side of Truro island, in "35 fathoms, soft bottom."

Nob islet is a small, round, wooded islet, 30 feet high, lying close to the western shore of Somerville island, distant 8 cables from the north extreme of Truro island. There is a remarkable white cliff just southward of Nob islet.

Start point, the north extreme of Somerville island, lies abreast Lizard point, 2¾ miles from it; it is high, and bold, with a deep bay close eastward of it.

Cliff point, 7 miles N. ¾ E., from Wales point, terminates in high cliffs. Immediately south of the point is a narrow creek, which extends some distance inland in a north-west direction.

Lizard point is a prominent point on the western shore, 3 miles N.N.E. from Cliff point. There are sandy bays close north and south of this point, extending back a considerable distance, giving to Lizard point the shape of a peninsula, and when first seen from the westward, it appears to be an island. At 2½ miles northward of Lizard point there are some conspicuous red-brown earthy cliffs.

Flat point lies 5¼ miles N. ¼ E. from Lizard point. The shore between these points is wooded and comparatively low, and a similar conformation exists 1½ miles northward of Flat point.

Portland point, about 18 miles within the inlet, lies 3 miles North from Flat point. This point, which forms the turning point into the south-east arm of Portland canal, is high, bold, and nearly steep-to.

Ramsden point, which divides Observatory inlet from Portland canal, lies 2¼ miles N.N.E. from Portland point.

A dangerous cluster of rocks (awash and sunken) extend 4 cables south-east from Ramsden point, with depths of 120 and 126 fathoms, mud, at 4 cables from the north-east and south-east sides.

Steamer passage, eastward of Somerville island, has an average width of half a mile. From its south entrance it takes a N.E. direction for 5½ miles, with depths of 23 and 29 fathoms water throughout; thence N. by W. for 5 miles, the water deepening to no bottom at 39 fathoms.

Khutzeymateen inlet is an unexamined arm, 5 miles within Steamer passage. It is half a mile wide at its entrance, and takes an E.N.E. direction.

Quinamass bay, on the eastern side of Steamer passage, abreast the north end of Somerville island, is half a mile wide at its entrance, and takes an easterly direction. At low water it is almost completely filled by a sand-flat, rendering the bay useless as an anchorage.

Nasoga gulf, eastward of Mylor peninsula, extends in a north-easterly direction for 5 miles, is one mile wide, and terminates in comparatively high land. There is no bottom at 39 fathoms in this gulf, except near the head.

Anchorage will be found, near the head of Nasoga gulf, in 10 to 12 fathoms, sand, in mid-channel, at 2 cables from the north shore.

Mylor peninsula, a high and comparatively narrow strip of land on the eastern side of Portland inlet, between Nasoga gulf and Nass bay, is 9½ miles long in a N. by E. and S. by W. direction, with an average breadth of 2 miles. A small islet (Ranger islet) lies off its south extreme and there the land is comparatively low (450 feet); but it rises quickly to the height of 2,900 feet, and forms high, bold, precipitous shores. About one mile from the north extreme of the peninsula the land again begins to fall, and terminates in Low point, the low wooded point which forms the south-west entrance of Nass bay.

Trefusis point, the south extreme of the peninsula, terminates in high white cliffs.

Ranger islet is a small bare islet, lying 3 cables from the shore of Mylor peninsula, at the entrance of Nasoga gulf.

Soundings.—The water in the southern portion of Portland inlet is deep, there being no bottom at 220 fathoms in mid-channel; at 2 cables from the western shore 99 fathoms; and at 2 cables from the eastern shore of the inlet 159 fathoms, mud.

NASS BAY* on the east shore lies immediately northward of Mylor peninsula, at the mouth of Nass river. It is 2 miles wide at its entrance the points of which lie north and south of each other, and the bay preserves this width in an easterly direction for 3 miles, where it divides, one branch taking a north-easterly direction to the mouth of Nass river, and the other a south-westerly direction, forming Iceberg bay.

An extensive sand-flat occupies nearly the whole of the eastern portion of the bay at low water. And the entrance into Nass river is obstructed by a bar upon which there is only 9 feet at low water.

The western portion of Nass bay is deep; but as the north shore is approached, it shoals suddenly from 45 to 15 and then 2 fathoms water.

Landmarks.—Low point is wooded, flat, and low. On the south shore of the bay, half a mile eastward of Low point, is Landslip mountain 2,042 feet high, with a bare side facing the north-west.

North point, the north entrance point of the bay, terminates in a bold cliff, and one mile eastward is Mission valley, a deep valley extending to the northward, on the western side of which, one mile back from the coast, is mount Tomlinson, a conspicuous mountain, 3,385 feet high. Through the valley a large stream runs, dividing near its mouth into two branches. Fort point, the north-west entrance point of Nass river, terminates in white cliffs. And on the eastern side of the bay, some low, dark islands (Mud islands) will be seen.

Kincolith, a mission station situated east of the stream at the mouth of the valley, is fronted by a sand-flat (Canoe flat), which renders communication by boat, except at high water, almost impossible. There are two saw mills here, one owned and worked by Indians. Gold is found here in small quantities, and also coal. The temperature is very severe, the thermometer in some winters falling to from 40° to 50° below zero for weeks in succession.

Observation spot, at the east side of mission valley, is situated in latitude 54° 59′ 26″ N., longitude 129° 57′ 36″ W.

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* *See* Admiralty plan:—Nass bay, No. 2,190; scale, $m = 3$ inches.

Canoe flat.—An extensive sand-flat commences at Fort point, and taking a south-westerly direction, forms a triangle, the apex of which lies 6 cables off shore, south-east of the mission station; thence it takes a north-westerly direction, and meets the shore half a mile westward of Kincolith.

Anchorage, in fine weather, may be had off Kincolith, nearly in the middle of Nass bay, on the line joining the mission station and Landslip mountain, in 10 fathoms, mud bottom, at about 8 cables from the north shore; with the mission flagstaff seen in line with the centre of Mission valley, bearing N. by E., and Leading point (south side of Nass river) seen just open of Fort point (north-west entrance of Nass river), bearing N.E. by E. $\frac{1}{2}$ E.

Caution.—A strong ebb tide will be felt in this position, and care must be exercised in taking up a berth, as Canoe flat is very steep-to, and it is recommended to use the deep-sea lead in approaching it.

Tides.—It is high water, full and change, at Nass bay at 1h. 5m.; springs rise 17 to 23 feet.

ICEBERG BAY, the south-west arm of Nass bay, is 3 miles long in a S.S.W. direction, and not less than 7 cables wide; the head of the bay, terminating in a low swampy flat, fronted by a sand-flat, is only 3 miles from the head of Nasoga gulf.

At the entrance of Iceberg bay the depth of 10 fathoms, and less, will be found; but as the head of the bay is approached the water will deepen to over 40 fathoms.

Anchorage may be obtained at the entrance to Iceberg bay, in 7 to 8 fathoms, mud, with the north-west entrance point of Nass bay (North point) seen in line with the north-west entrance point of Iceberg bay (Double islet point) bearing N.W. by W. $\frac{1}{4}$ W.; distant 6 cables from the latter.*

Directions.—If taking up this anchorage, having rounded Low point at a distance of 3 cables, keep the south shore of the bay on board; pass one cable northward of Double islet point, and anchor with that point in line with North point, on the bearing above given.

Mud islands consist of two small islands lying $3\frac{1}{2}$ cables N.N.E. and S.S.W. of each other, parallel to the eastern shore, at 6 cables from it. The northern island is 145, and the southern 106 feet high.

NASS RIVER flows into the north-east corner of Nass bay, the mouth of the river being, however, obstructed by a sand-flat, which dries

* H.M.S. *Scout* anchored in 10 fathoms south-east of the two small islets, with just sufficient room for the ship to swing. The tide, which runs strong in the fairway, is in this position scarcely felt.—Navigating Lieutenant E. S. Clapp, R.N., 1872.

at low water, and extends towards Iceberg bay. Ripple tongue, the south-west extreme of this extensive flat, lies 2½ cables North from Double islet point.

Within the river, the navigation is difficult and dangerous, the channel at low water being barely available for large canoes; local steamers, however, from Victoria, drawing 6 feet water, venture up though they frequently run aground. The Nass river, at its entrance abreast Fort point, is 1½ miles wide, whence its direction is E.N.E. for 7 miles, and N.N.E. for 7 miles, to abreast the Nass villages. The channel near the mouth of the river being tortuous, the distance by the channel from Fort point to the Nass villages is about 16 miles. The river continues in a north-easterly direction for 25 miles beyond the lower Nass villages, and there divides, one branch running in a north-westerly direction. Kilawālāks, the head of canoe navigation, is situated on the N.W. branch 40 miles from the lower Nass villages. There were said to be, in 1868, 600 natives at Kilawālāks.

Two salmon cannaries, a saw mill, store, two missionary stations, and several Indian villages are situated along the stream. The climate is favourable to the growth of fruit, cereals, and root crops near the coast.*

Nass villages.—The lower Nass villages, three in number, are situated 16 miles from the entrance, the north and south villages being situated on islands, and separated from the middle village at high water. The south, middle, and north villages are known, respectively, by the names of Kit min i ook, Kit lah kum ka dah, and Kit a kauze. The population of the three villages amounted in 1868 to about 500.

Tides.—The time of high water at the lower Nass villages is uncertain, depending apparently upon the freshets down the river. There was no slack at high water, the water beginning to fall immediately it had ceased to rise (August 1868). At low water there was slack for one hour and a half. In the month of August the flood stream was not felt above the Middle bank, and from Indian report this is the case at all seasons.

Ice.—The river is reported to freeze over down to its mouth during severe winters.

Fish.—The Houlican, from which the nutritious oil is obtained, the principal sustenance of the Indians, are caught in great numbers during the spring, as also are salmon. For this purpose, numerous fishing weirs are erected along the banks of the river, especially on the south shore; and about 13 miles up, near Stony point, there is an establishment where the fish are salted down and shipped off to Victoria.

* *The West Shore.*

Directions.—The Nass river is used by small coasting vessels after half flood. The navigable channel is tortuous, and it is recommended not to attempt the river until the strength of the flood tide has slackened. The channel is liable after freshets to change.

OBSERVATORY INLET, northward of Nass bay, and called by the Indians Kit sah watl, is generally speaking similar to the other inlets; in some parts however the shores are low, and wooded, the land rising at a few miles back to 4,000 and 5,000 feet high. The low wooded shore has an undergrowth of thick moss, overlying rock, and saturated with moisture, which renders travelling difficult.

Abreast the north-west entrance point of Nass bay, Observatory inlet is 1¼ miles wide, having a general northerly direction for about 12 miles, thence N. by W. for 4 miles, and widening to 3 miles abreast Salmon cove. Northward of Salmon cove, the inlet widens to 4 miles, and at 6 miles from the cove, is obstructed by several islands, islets, and rocks. At 10 miles from Salmon cove the inlet divides into two arms, one taking a north-easterly direction for 12 miles, the other a north-westerly direction for 15 miles; both arms terminating in low, wooded swamps, fronted by mud flats.

SALMON COVE* lies on the western shore, 19 miles from Ramsden point and 39 miles from Wales point.

Richard point, the north point of Salmon cove, is a long, wooded, conspicuous projection. From its north-east extreme the land trends in a south-westerly direction, for 1¾ miles, to the head of Salmon cove, which is barely 3 cables wide in that position.

A sand-flat extends 2 cables from the south shore at the entrance to Salmon cove.

Anchorage was obtained by Vancouver in Salmon cove "in 31 and "35 fathoms water, muddy and small stony bottom. The points of the "cove bore by compass N.N.E. and S. by E., and the nearest land W. by "S., 1½ cables distant; and the opposite shore of the inlet E.N.E. one "mile distant."

Anchorage was also obtained by Vancouver in 30 fathoms, on the eastern, shore, one mile northward of Salmon cove. On two other occasions he anchored in Observatory inlet, in 85 and 45 fathoms respectively, "steadying with a hawser to trees on shore."

Soundings.—The water in the reach south of Salmon cove is deep, there being over 100 fathoms in mid-channel. The shores are compact and steep, with no known danger beyond 1½ cables from the shore.

* This cove was so named by Vancouver from the abundance of salmon found in a stream which flowed into it.

Brooke island, 2¾ miles long and half a mile broad at its northern end, is low and wooded. The south extreme of this island lies 4 miles northward of Richard point, and 5 cables from the eastern shore.

Several patches of rock, which uncover at low water, extend 5 cables northward from Brooke island.

Paddy passage is half a mile wide, between Brooke island and the eastern shore, but near its northern end it is barely 2 cables wide; the navigable channel being reduced to that width by the ledges which extend northward from Brooke island.

Frank point, situated 5 miles N. by W., from Richard point, and 1¼ miles from the western shore of Brooke island, is low, and wooded; between it and Richard point the land trends considerably to the westward, and forms near the latter point a bight nearly 2 miles deep. Northward of Frank point, the western shores are much broken, with several deep bays, which take a southerly direction.*

Xschwan is the name of a salmon fishery which lies at the head of a small bay on the western shore, 4 miles northward of Frank point.

Larcom island, situated nearly in mid-channel, at the mouth of Hastings arm, is about 5 miles long, in a N.N.W. ½ W. and S.S.E. ½ E. direction, with an average breadth of half a mile; its south extreme lying 6 cables north-westward from Brooke island. The island is flat, wooded, and comparatively low. At its south-west end, there is an extensive lagoon.

The Channel westward of Larcom island, is obstructed near the north end of that island by several islets and rocks, and is only available for boats.

HASTINGS ARM passes eastward of Larcom island, and takes a general N.W. ½ N. direction for 4 miles, thence westward for about one mile, and N.W. by N. for 9 miles, until it terminates at the head of the inlet.

This branch of Observatory inlet is from one-half to one mile wide, terminating in the usual manner,—a wooded swamp, fronted by a mud flat.

Directions.—The water in Hastings arm is deep with no known anchorage ground. If proceeding into this channel, pass between Brooke and Larcom islands, taking care to avoid the foul ground which extends half a mile northward from the former; a mid-channel course is clear of danger.

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* Vancouver camped in the bay nearest to Frank point. He states that having pitched his tent among the pine trees, "at least 20 feet above the surface of the water at "our landing, and as we thought sufficiently without the reach of the tide, yet at about 2 "in the morning (25th July 1793) it flowed into our tents, and we were obliged to return "to our boats."—Vancouver's Voyages, Vol. II., p. 336.

ALICE ARM, the eastern branch of Observatory inlet, from its junction with Hastings arm, runs in a northerly direction 3 miles, N.E. 3 miles, E. by N. 4 miles, and N. by E. 3 miles, terminating in the usual manner. This arm is obstructed at its entrance by a small wooded island Liddle island) which divides it into two channels 3 cables wide. There is a depth of 23 fathoms in mid-channel in the southern, and 16 fathoms in the northern of these passages.

Alice arm varies in width from half a mile to 2 miles; the latter being a the head of the inlet. The flat at the head is extensive, and through it a large stream flows, flanked on its eastern side by mountains over 5,000 feet high.*

Perry bay, situated on the eastern shore at the entrance to Alice arm, is 2½ cables wide, and takes a southerly direction for nearly one mile, with depths of 14 and 18 fathoms, mud bottom, in mid-channel.

Off its western entrance point lies a small islet (Sophy islet). At the head of the bay there is a salmon fishery (Muckshwanne).

Tides.—The strength of tide in Observatory inlet depends upon the freshets caused by the melting snow. Abreast Nass bay, the ebb ; with great strength, the blue water being clearly defined when m the muddy waters of the Nass river.

It is high water, full and change, in Observatory inlet at 1h. 5m.; springs rise 23 feet, neaps 12 feet.

PORTLAND CANAL.—At about 20 miles from Wales point, an arm branches off N.W. 6 miles, with an average breadth of 1½ miles. Here a channel (now named Pearse channel) stretches to the south-west, which was not examined in the survey of 1868. From this the canal trends North about 13 miles to abreast Camp point; thence in a direction varying from N.W. ½ W. to N.W. ½ N. for about 30 miles, and finally, Northerly for about 12 miles, to its termination. Throughout the canal no soundings were obtained at 40 fathoms. It possesses the general characteristics of the other fiords on the coast of British Columbia, viz., high land on both shores, terminating in low swampy land at the head, and deep water, with few and indifferent anchorages.

In places the mountains rise almost perpendicularly above the high-water line to the height of 6,000 feet. Their summits were (August 1868) snow-clad, and the melting snow produced many waterfalls and avalanches; the latter could be heard falling almost constantly during the day-time. With the exception of a few wooded valleys at the mouths of streams, the snow line was very low at midsummer, being within 20 feet

* Vancouver met with friendly natives, whose village was at the head of this branch. Their language, in some respects, resembled that spoken at Queen Charlotte island.

of the high-water line in some of the valleys on the western shore, and reaching to within 500 feet of the high-water line on the mountain sides.

The head of Portland canal terminates in low, woody, swampy land, through which two rivers flow into it.

The two rivers (Bear and Salmon) at the head of Portland canal are separated by a high ridge of bare mountains. On the east side of the valley of Bear river a mountain range extends in an east and west direction; mount Disraeli, the highest peak of the range, being a snow-clad pinnacle, 7,000 feet high. The delta of the Bear and Salmon rivers consists of a mud flat, which covers at high water, and extends over one mile from the mouth of the former river. This deposit of mud is nearly steep-to, breaking down suddenly to no bottom at 40 fathoms.

Current.—During the month of August 1868, a current of about 1½ knots an hour was observed, setting down Portland canal, to the distance of 25 miles below the mouth of Bear river.

Climate.—The sun's rays in August, between 9 a.m. and 3 p.m., were very powerful, and, reflected from the snow, caused occasionally intense heat. When the sun was obscured by the mountains, the atmosphere at once conveyed a sensation of chilliness. During that month, just before sunrise, the thermometer registered 32° Fahrenheit, water left in basins within the tent being frozen during the night. The vapour developed by the heat of the sun during the early portion of the day, becoming condensed on the mountainous shores of the inlet, usually fell as a drizzling rain from 3 p.m. to about midnight.

Temperature of the surface water, within 20 miles of the head of the canal, was 33°. At that distance from the mouth of the Bear river the water on the surface was fresh.

Supplies.—Salmon, mountain sheep, bears, and berries abound at the head of Portland canal.

Timber, &c.—Pine and cedar are the principal trees met with, the former tall, and almost bare to the top, and frequently above 100 feet high. Cedars are found in many places of great size, with branches close to the ground. Maple trees are occasionally seen, being distinguished by their light and variegated tints of green. Yellow cypress is also met with, being distinguished from the pine by its leaf, convex on both sides, and by its peculiar odour.

The wood of the yellow cypress is light, tough, and durable, and useful for repairing or building boats.

Natives.*—A party consisting of about 200 natives were met with fishing at the mouth of Salmon river; they annually visit the head of the Portland canal.

Dogfish bay,† situated on the eastern shore, about 3½ miles north-westward of Ramsden point, is about 1½ miles wide, half a mile deep, and faces the south-west; it is, however, filled by a sand-flat at low water, rendering it useless as an anchorage.

Windy islet is small, and lies close to the shore at the north entrance point of Dogfish bay.

Tree point, on the western shore, 4½ miles from Portland point is low, wooded, and conspicuous, with high land at about one mile south of it.

Tree point reef extends half a mile in a northerly direction from Tree point, and is nearly steep-to.

Spit point, on the eastern shore, 6 miles from Ramsden point, is the turning point into the northern reach. Between Spit point and Dogfish bay several small wooded islets lie close to the eastern shore, and are connected with it at low water. A tongue of sand, which uncovers at low water, extends 3 cables south-west from Spit point.

Reef island, a small island lying on the western shore abreast Spit point, lies 2¾ miles N.W. from Tree bluff, and 1¼ miles W.S.W. from Spit point.

Two small bays, with sandy beaches, lie under Reef island, in which a boat may find shelter. A reef with rocks awash at high water, and sunken rocks, extends 2 cables south-east from Reef island.

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* These Indians (apparently of the Nass tribe) were civil to the Admiralty surveying party. By order of their chief they cleared the ground and helped to pitch the tent, brought the gear out of the boat, hauled her up, and placed canoes at the party's disposal.

They had, they stated, never before met white men at the head of Portland canal, nor heard of any visiting it. Their canoes were manipulated with marvellous dexterity. When shooting the rapids, one man stood in the bow, and another in the stern, each armed with a long pole carried on opposite sides of the canoe. When nearing a boulder over which the torrent boiled, and when destruction seemed imminent, the man in the bow placed his pole in the ground, the current caught the canoe, reversing her end for end, clear of the danger.

† Halibut weighing three hundredweight are caught off Dogfish bay. The Indians use for this purpose a large wooden hook, not unlike an anchor with one arm. The line is made of gut, and the bait is usually clam or other shell fish. The fish are caught in depths of 100 fathoms, and upwards.

From mid-channel between Reef island and Spit point, the canal has a North direction for about 13 miles, with an average width of one mile. The eastern shore of this reach is bold and unbroken, but on the western shore are two small bays.

Leading point, a high bold point, on the western shore, lies 2½ miles north from Reef island.

Dickens point is on the eastern shore, 4 miles from Spit point, the coast between them having a considerable curve to the eastward.

A small black rock, 8 feet above high water, lies close south of Dickens point, and a ledge of rocks which uncover, extends 2 cables from the point.

Sandfly bay, situated on the western shore, abreast Dickens point, is half a mile wide, and three-quarters of a mile deep in a north-west direction, terminating in a swamp with streams in the north-west and north-east corners. At the north point of the bay, two small islets lie close to the shore.

Sandfly bay is nearly filled up at low-water by a sand-flat, with deep water close-to, and is therefore useless as an anchorage.

Stopford point, bold and conspicuous, lies on the eastern shore, 3¼ miles from Dickens point.

HALIBUT BAY on the western shore, 4 miles from Sandfly bay, is half a mile wide at its entrance, and extends back 1½ miles in a N.W. by W. direction, having an extensive swamp at its head, through which three large streams flow. Off the south point of this bay lie a cluster of small black rocky islets.

Anchorage.—The only known anchorage in Portland canal is in Halibut bay, in mid-channel, at 3 cables within the entrance, in 6 to 10 fathoms, mud bottom.

Cross islet, a small wooded islet, connected at low water with the shore, lies close northward of Halibut bay. A rude wooden cross was found on this islet, placed there at some remote period, apparently to mark a grave.

Logan point lies on the eastern shore, 3¾ miles from Stopford point. At 3 miles south-east of Logan point, is a conspicuous saddle-shaped mountain, 5,057 feet high.

Camp point, on the western shore, is the turning point of the northern arm, which abreast of that point changes in direction from North to W.N.W.; it is wooded, bold, and precipitous.

Centre island, situated nearly in mid-channel, abreast Camp point is 400 yards long in a north and south direction, with some stunted brush growing upon it.

A ledge of rocks awash, and sunken rocks, extend 2 cables northward from Centre island. The water is deep on either side of the island, beyond the distance of 2 cables from it, but the channel westward of the island is recommended.

Barclay valley lies on the eastern shore, abreast Centre island; a large streams flows through it, and the neck of land separating Portland canal and Salmon cove (Observatory inlet) is here about 4 miles across.

Landslip point lies on the eastern shore, 2 miles northward of Centre island. Three conspicuous landslips are seen on the mountains south of Landslip point.

Bluff point terminates in a high bold cliff, and lies on the eastern shore, 2 miles from Landslip point. The channel abreast Bluff point is one mile wide.

Breezy point, on the western shore, 3½ miles from Camp point, is conspicuous, and the land recedes to the southward between Camp and Breezy points.

Tombstone bay lies on the western shore, 3 miles N.W. by N., from Breezy point. At its entrance, the bay is 3 cables wide, and takes a southerly direction, narrowing rapidly, until it terminates at one mile within the entrance at the mouth of a river.

An extensive well-wooded valley lies at the head of the bay, and on the north side of the valley, a remarkable mountain, with a snow-clad summit of dome shape, rises to the height of 6,500 feet. Trout are plentiful in the river flowing into this bay. Berries are found in abundance, especially salmon berries and the wild raspberry.*

Maple point lies on the eastern shore, 3 miles from Bluff point. Maple trees grow upon this point, and when in leaf render it conspicuous. Immediately northward of Maple point is a bay, with a large stream flowing into it, fronted by a sand-flat.

Swamp point, a low, marshy, wooded point, through which a river flows, lies 3 miles N.W. ½ W. from Maple point. A sandspit extends half a mile to the southward from Swamp point.

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* An Indian settlement once existed on the shores of this bay. The inhabitants had apparently, been overtaken by an epidemic, as many skeletons were seen lying on the ground, with boxes and various chattels near them. A rude sort of tombstone had been erected near one of the skeletons.

Above Swamp point, the channel takes a general direction of N.W. ½ W., to abreast of White point.

Pirie point, situated N.W. by W., 2 miles from Swamp point, is high, bold and conspicuous. A sand-pit extends 2 cables from the eastern shore mid-way between Swamp and Pirie points.

White point lies on the eastern shore, 4 miles from Pirie point.

From abreast White point the channel takes a general direction of N.N.W. ½ W. for 7 miles, to abreast of Blue point.

Turn point lies on the western shore, 1½ miles from Tombstone bay and is high, bold, and conspicuous.

Steep point on the western shore, 6 miles from Turn point, is bold and steep-to. Two large streams flow into the sea, mid-way between Turn and Steep points.

Foggy point lies on the western shore, N.W. ½ W., 6 miles from Steep point. The coast between Steep and Foggy points trends considerably to the southward in a deep curve, and at 2½ miles southward of the point is an extensive valley lying in a southerly direction, between mountains from 3,500 and 4,000 feet high. The valley is thickly wooded, and a large stream flows through it.

Bay islet, on the eastern shore abreast of Foggy point, is small and wooded, and lies one cable off a point which divides two sandy bays, being connected with the point at low water.

Green islets are two small, wooded islets, on the eastern shore, 2 miles from Bay islet. Close northward of these islets there is a considerable tract of comparatively low land, thickly wooded, through which a large stream flows.

Slab point, terminating in a high, smooth, slate-coloured cliff, lies on the western shore, 2 miles from Foggy point.

Blue point, on the eastern shore, 5½ miles from Green islet, and 1½ miles from Cliff point (on the western shore), terminates in high, bold cliffs, of purple blue colour, and basaltic formation. Close south of the point, an extensive wooded valley extends to the north-eastward, through which two large streams flow. A sandspit extends off their mouths to the distance of 2 cables.

Cliff point terminates in high white cliffs, and is steep-to. From mid-channel between Blue and Cliff points, the inlet runs in a N.W. direction for 2½ miles, then N.N.W. ½ W. 3 miles, and thence in a general northerly direction to its termination.

Verdure point, on the western shore, lies 4 miles N.W. by N. from Cliff point. The maple trees growing upon this point, when in leaf, render it conspicuous.

Mid-way between Cliff and Verdure points, there is an extensive wooded valley, through which a large stream flows in a south-westerly direction. Close northward of Verdure point is a bay, with a conspicuous sandy beach at its head.

Landslip point, one mile N.W. by N. from Verdure point, is conspicuous, it having high landslip over it.

Round point is the turning point, on the eastern shore, into the northern and last reach of Portland canal. With the exception of a small bay, which dries throughout at low water, the eastern shore northward of Blue point, for 6 miles, is high, bold, and almost inaccessible. The northern extreme of Round point lies 6 miles from Blue point.

Seal rocks* on the western shore, at the entrance of the north reach of the canal, are of small extent, and lie 2 cables from the western shore. The highest rock is 6 feet above high water. Between Verdure point, and the point off which Seal rocks lie, the coast curves considerably to the westward. At one mile to the southward of the latter point, an extensive wooded valley takes a westerly direction, between high mountains, and a large stream flows through it.

Marmot river, on the eastern shore, $2\frac{1}{2}$ miles from the mouth of Bear river, flows through an extensive valley which lies in an easterly direction. A sandspit extends 3 cables off the mouth of Marmot river, and is steep-to. At the head of the valley, a mountain range with three conspicuous peaks, 4,000 to 5,000 feet high, extends in a north-west and south-east direction.

Salmon river, on the western store, $1\frac{1}{2}$ miles from Bear river, is separated from that river by the Reverdy Johnson mountains, a range of bare mountains 4,000 to 5,000 feet high. It is a stream of considerable size, and the valley through which it flows is half a mile wide at its mouth, the river then takes a north-westerly direction, widening to one and 2 miles, and is flanked by high mountains. The north shore, near the entrance of the valley, in 1868 was the head quarters, during the fishing season, of a party of Indians, apparently of the Nass tribe.

Bear river flows through an extensive wooded flat, at the head of the Portland canal, and divides near its mouth into several streams, from which, during the summer months, when the snow is melting, a considerable body of water passes out into the inlet. The valley through which this river flows extends 10 miles in a northerly direction from the mouth of

* Many fur seals were seen upon this cluster (August 1868).

Bear river, and is thickly wooded, and flanked by the Gladstone mountains, 4,800 feet high; it terminates at the foot of the Disraeli mountains, a range which extends in an east and west direction. The Bear and Salmon rivers have a mud flat extending across their mouths, rendering communication, even by canoes, difficult at low water. Commencing at about 3 cables south of Salmon river valley, this deposit of mud extends across the canal in a north-easterly direction, passing over one mile from the mouth of Bear river. The edge of the bank is steep, breaking down almost suddenly to no bottom at 40 fathoms.

Anchorage was unsuccessfully searched for off the above-mentioned delta of the Salmon and Bear rivers. The depth of 24 fathoms was found alongside the edge of the mud at low water; and at the distance of 50 yards from it, no bottom could be obtained at 40 fathoms.

Tides.—It is high water, full and change, at the head of Portland canal at 1h. 30 m.; springs rise from 23 to 27 feet, and occasionally 30 feet, neaps 15 to 20 feet. In August 1868 it was noticed that the night tides rose considerably higher than the day tides.

Observation spot, at the wooded high-water mark of the point near the centre of the mouth of Bear river, was found, by observations taken in August 1868, to be situated in latitude 55° 56′ 03″ N., longitude 130° 03′ 27″ W., depending on Duntze head, Esquimalt harbour being in longitude 123° 26′ 45″ W.

CHAPTER XV.

QUEEN CHARLOTTE ISLANDS.

VARIATION, 26° 10′ East in 1888.

QUEEN CHARLOTTE ISLANDS, consisting of three principal islands, may be regarded as a partly submerged mountain range,—a line drawn from the southern extremity of the islands to their north-western point, representing its axis,—which, together with several smaller islands, forms a compact archipelago, situated between the parallels of 51° 50′ and 54° 15′ N., and the meridians of 130° 54′ and 133° 10′ W.*

The general character of these islands is mountainous and heavily timbered, and the mining resources are very extensive. The only industry at present is the manufacture of oil from the dog fish. The chief item of trade is in fur seals, the value of which is about 10,000 dollars annually.†

The channels between the main islands are named Houston Stewart and Skidegate, the former or southern channel separating Prevost and Moresby islands; and the latter, or northern, Moresby and Graham islands.

PREVOST ISLAND, the southernmost island of the group, is about 12½ miles long north and south, with a breadth of 8½ miles. The land gradually rises northward from cape St. James (its south point) till near Houston Stewart channel, where it has in places an elevation of about 2,000 feet, which heights, if the weather is clear, will be the first land seen on approaching Queen Charlotte islands from the southward.

The east coast of Prevost island is bold, and in many places bordered by steep cliffs. This part of the coast, between cape St. James and East point, a distance of 12 miles, is indented by two bays or inlets, the southern apparently inconsiderable, while Luxana bay, the northern, is probably 3 or 4 miles in depth. From East point the shore trends north-westward 6 or 7 miles to Moore head, the south-east entrance point of Houston Stewart channel. The shore is much broken, being penetrated by inlets which extend back among the high hills. Several small islands lie off it, one of which is bold, densely covered with trees, and has a height of 150 feet.

The western side of Prevost island, between cape St. James and the western entrance of Houston Stewart channel, for about 12 miles is

* *See* Admiralty charts:—Queen Charlotte islands, No. 2,430; scale, $m = 0{\cdot}13$ of an inch. Also, Cape Caution to Port Simpson, No. 1,928, *a* and *b*; scale, $m = 0{\cdot}25$ of an inch.

† For climate and wind, *see* pages 5, 10.

apparently bold, but it is less known than the opposite side. The land near cape St. James is not as thickly wooded as that to the northward.

Cape St. James, so named by Captain Dixon who rounded the cape on St. James' day 1787 in the *Queen Charlotte,* appears to be the southern extremity of an island one mile in diameter, the narrow channel separating it from Prevost island running W.S.W. and E.N.E. The southern point of cape St. James is a vertical cliff about the same height as the larger of the islets lying off it. The cape slopes gradually from a summit 1,000 feet high to the sea, low at its extreme, with the Hummock islets lying off it (two apparently detached hummock islets), about 180 feet high; outside these again lie three others, nearly 100 feet high, bare and whitish; the western side of the cape is also whitish.*

Cape St. James is situated in latitude 51° 54′ 0″ N., longitude 131° 2′ 0″ W.

Kerouart islets received their name from La Perouse, and consist of a chain of rocky islets and rocks which run off from cape St. James 3½ miles in a south-easterly direction, corresponding with that of the mountain axis of the group. A sunken ledge is reported to extend 1½ miles further in the same direction. As seen at a distance of some miles to the north-east, Kerouart islets appear to form three groups, the first lying close to Cape St. James, consisting of two large rocks (Hummock islets), the second of one large and several smaller rocks, and the third and furthest southward, of two or three rocks of some size and a number of lesser ones. These islets are remarkable, standing boldly up with rounded tops, and vertical cliffs on all sides; the smaller rocks having the same pillar-like form so frequently found where a rocky coast is exposed to the full sweep of a great ocean. They serve as secure breeding places for innumerable gulls, puffins, and other sea birds.

With cape St. James bearing W. by S. ¾ S. about 3½ miles, and the northernmost rock above water S. W. ½ S., there is a depth of 90 fathoms. Precaution is necessary when approaching this part of the coast.

HOUSTON STEWART CHANNEL† trends from Moore head W.S.W. 2½ miles to Hornby point, thence S.S.W. 3 miles to the entrance from the Pacific ocean. Opposite the bend formed by Hornby point is Rose harbour. Louscoone, at the west entrance of the channel and just within Anthony island, is said to be a good harbour similar to Rose harbour. The country round this locality is mountainous, mostly rising steeply from the shore, and thickly wooded; the trees, however, are stunted and show much dead wood, the roots holding to the almost naked rock. There is no

* Captain G. H. Richards, H.M. surveying vessel *Hecate,* 1862.

† *See* Admiralty plans of ports, &c. in Queen Charlotte islands, No. 2,168.

arable land, and the little soil is poor. Sea otters are numerous, the fur of which fetches very high prices.

Entering from the Eastward.—This entrance may be known by its bold south point, and the round thickly wooded islet. At about 4 miles from the entrance there are 90 fathoms water, and the depth gradually shoals to 20 fathoms to within one mile of it; from this distance off, the soundings are very irregular, varying from 30 to 7 fathoms over a series of ridges or bars of rock, sand, shell, and mud. In the entrance, which is about one mile wide, between Moore head and Langford point there are 20 fathoms water, with a rocky bottom.

Raspberry cove.—Within Forsyth point, at one mile westward of Langford point on the northern side, is a snug bay, bordered by a sandy beach, in which, at about two-thirds of a mile from Forsyth point, and at one-third of a mile from the beach, is a secure and convenient anchorage in 16 fathoms. In the north-west part of the bay is Raspberry cove, into which a stream of water flows.

Rock.—At a quarter of a mile inside Forsyth point, and a little to the northward of the line of the direction of the channel, is a rocky patch with kelp on it which dries at low-water springs; a vessel, therefore, should not haul to the northward too soon after entering.

On the southern side of the channel are some small wooded islands, here and there fringed with outlying patches of kelp, which latter should always be avoided.

Trevan rock, 1¼ miles W.S.W. from Forsyth point, lying nearly mid-channel, and contracting the passage on its northern side to rather less than half a mile; patches of kelp and Ellen island, the largest of the islands before mentioned, reduce the channel on the southern side of it to about one cable in width. Trevan rock is covered at high water; close to the north side of it the depth is 7 fathoms.

Anchorage.—There is a good anchorage to the eastward of Ellen island,* which was used by H.M.S. *Alert* in 1858, in a bay formed by the island and a rocky patch which covers at half tide, at nearly half a mile to the eastward of the island. The anchorage is in 14 fathoms, mud, and the tide is not felt.

ROSE HARBOUR.—This secure and capacious harbour on the north side of Houston Stewart channel, takes a N.N.W. direction between Catherine point on the west and Ross island on the east, for 3 miles from its junction with the channel, and is a continuation in nearly a straight line with the western portion of it. For the first 2 miles the average breadth

* Navigating Lieutenant A. F. Boxer.

of the harbour is three-quarters of a mile, the western shore rising boldly with deep water close-to; the eastern shore, although high, has kelp along it, with shoal water, extending for a distance of from one to 2¼ cables. The harbour then contracts to half a mile in width between two low points forming its head, beyond which is a basin, about 2 miles in circumference, filled with rocks and wooded islets, having on its western side Sedmond river, a small stream abounding in the season with geese and ducks. The land on its north and west sides is high and mountainous, whilst that on its eastern side is low. This basin is separated from South cove in Carpenter bay by a narrow neck of low wooded land.

Pincher rocks lie nearly 2 cables S. by E. from the east entrance point of the basin.

Danger rocks.—About 3 miles to the northward of the eastern entrance to Houston Stewart channel, and at about 2 miles off the low and densely wooded point between the east entrance of Houston Stewart channel and Carpenter bay, is a ledge of rocks, lying a little above water, on which the sea breaks violently, and for a considerable distance around; other rocks encircle these, but they are under water. Approaching Houston Stewart channel from the northward, these rocks should be given a wide berth. On the north side of the low wooded point is a little cove full of kelp and protected by rocks, with an Indian house in it, which appears to be occupied at times.

Entering from Westward.—The southern arm of Houston Stewart channel is about 3 miles long, and three-quarters of a mile wide, with several small islands (Gordon isles) at its southern end or entrance from the Pacific. The shores of both sides are bold and densely wooded. Vessels from the southward bound in by this entrance, when abreast cape St. James, should close the land to 1½ miles, and after coasting it for about 12 miles, the entrance will open out. Two remarkable white stripes down the mountains, 6 or 7 miles to the north-westward, are excellent landmarks. After passing at a convenient distance to the southward of Anthony island, the largest and outer island at the entrance, which is 200 feet high, with white cliffs (off the southern end of which an extensive ledge of rocks projects 4 cables in a south-west direction), the channel will show itself. Flat rock, 50 feet high, bare and resembling a haystack, lies much nearer the western than the eastern side, and which should be kept on the port hand, will be a good guide.* There is an Indian village known as Ninstints, of the Shangoi tribe, on the inner side of Anthony island; the natives are very wild, and persons visiting or trading with them should be on their guard.

* H.M.S. *Hecate*, September 1862, passed between Flat rock and Gordon islets, and anchored in Raspberry cove, on the north shore, in 16 fathoms.

MORESBY ISLAND, the centre of the three principal islands of the Queen Charlotte group, is 72 miles long, but explorations on its east coast have resulted (by tracing out of the channels), in leaving it a mere skeleton, in places varying from only 1½ to 2 miles in breadth. The highest and most rugged part of the island is probably in about latitude 52° 30′, where many peaks bear patches of perennial snow, and attain altitudes of over 5,000 feet. Also on Louise island, and about the head of Cumshewa, the land is very rugged, with many summits of over 3,000 and 4,000 feet in height.

CARPENTER BAY, the southernmost bay on the east side of Moresby island, is between Iron point on its north-western, and Islet point on its south-eastern side, a little over 2 miles wide, extending westward about 5 miles. It is not quite land locked, but is sheltered from the only direction otherwise exposed, by a little rocky reef which extends out from its east side. On its south side are two small bays, the western of which, South cove, approaches near to the head of Rose harbour. At its head is good anchorage for a small vessel in from 6 to 10 fathoms.

Carpenter bay ends westward in a narrow arm, which receives two streams of some size. It resembles the head of Rose harbour in being filled with small rocky islands, and rocks, making it unsafe for even a small craft. The general character of the country surrounding the bay is like that of Houston Stewart channel. In June there were many seals in the bay.

Collison bay, situated between Carpenter bay and Skincuttle inlet, is about 1¾ miles wide between Bluff point, its south-east point of entrance, and the north-west point, and has a probable depth of 2 miles. It runs up into a narrow arm, which has not been examined. Several small islands and rocks lie off its entrance, and it does not appear to be serviceable as a harbour.

Gull rock, 10 feet high, bears N.E. by E. 1⅓ miles from Deluge point, and is three-quarters of a mile off Moresby island, between Collison bay and Skincuttle inlet. Inner Low rock lies S.S.E. from Gull rock, and midway between it and the shore.

SKINCUTTLE INLET* is 5½ miles deep in a south-west direction, with a width of 4 miles between Deluge point on the south and Granite point on the north side of its entrance. The north side of the inlet is

* A small shaft has been sunk and a few openings made in connection with an attempt at copper mining. There is no true vein here, but magnetic iron ore, with a little copper pyrites.

See Admiralty plan :—Skincuttle inlet, on sheet of Ports in Queen Charlottle islands, No. 2,168 ; scale, $m = 0{\cdot}5$ of an inch.

formed by Burnaby island, and from the north-west angle Burnaby strait runs northward to Juan Perez sound, and separates Burnaby island from the east shore of Moresby island. The shores of Skincuttle inlet resemble those of other parts of the islands already described. Near the north-west angle of the inlet the mountains rise steeply to a height of 3,000 feet or more.

The entrance to Skincuttle inlet is south of a chain of islands, called the Copper islands, lying E.N.E. and W.S.W. It is 1½ miles wide, but should be used with caution as there is reason to believe that a rock, sometimes bare, lies in it. The passage to the north of the Copper islands is contracted, and with one or more rocks in its narrowest part.

Granite point is a rather remarkable whitish crag, separated from the main shore by a narrow neck of low land.

The Bolkus islands, five in number, with many small rocks and reefs, form a chain about 2 miles long, lying east and west in the centre of Skincuttle inlet. The land is low, and on the western and largest of the islands the soil appears to be good, though now covered with dense forest.

A rock awash at high water lies midway between the Bolkus islands and the south shore, and at equal distances from the entrances to Harriet harbour and Huston inlet. Bush rock is situated at the distance of one cable north-west from the east entrance point of Huston inlet, and 8 cables W. ¼ S. from it is Low Black rock.

Harriet Harbour, the first opening on the south shore of Skincuttle inlet, is 2 miles westward from the south entrance point (Deluge point), and extends southward one mile. It should be entered by the channel on the west side of Harriet island, which lies at its entrance, and a vessel should be kept near the west side of the channel (as several small rocks covered at high water lie along Harriet island), and run some distance beyond the inner end of the island before anchoring, to avoid the shoal bank which lies off its point. The depth is about 8 fathoms, with good holding ground, and the harbour is well sheltered from most directions, though subject to heavy squalls from the valley at its head when a southerly gale is blowing.*

Huston inlet, 1½ miles west of Harriet harbour, is a wide inlet which runs south-eastward about 4 miles, and then turns to the west, in which direction its extremity was not visited, but it approaches the western side of Moresby island to within about 1½ miles.

* H.M.S. *Hecate*, September 1862, anchored in Skincuttle in 9½ fathoms at low water, with east side of Harriet island bearing S. 27° E., right extreme of Flat islands N. 39° E., and Green inlet N. 89° E.

Tangle cove.—At the western end of Skincuttle inlet are three indentations of the coast, of which the southern is George harbour. The northern, lying at the entrance of Burnaby strait, is Tangle cove, a well sheltered anchorage for a small vessel, but a shoal, the extent of which is unknown, lies off its entrance. The entrance is between a small island at its south side, and two other little islets to the north, and in it is a rock which uncovers at low water. The mountains at the head of Tangle cove are steep, and probably reach 3,000 feet in height; part of their upper slopes are bare of trees, but apparently covered with moss, where not composed of rock.

North side.—On the south shore of Burnaby island is a bay, with several small islands across the mouth of it, which may be a good harbour, but it has not been examined. Farther east, in the vicinity of an abandoned copper mine, are Blue Jay and Kingfisher coves.

BURNABY STRAIT, between the west shore of Burnaby island and Moresby island, is 9 miles in length between Skincuttle inlet and Juan Perez sound, the southern portion for a distance of about 4 miles being narrow, but gaining at the northern end an average width of 1¼ miles. All parts of Burnaby strait must be navigated with great caution, as there are many rocks. and a large portion of them are covered at high water.

Dolomite narrows, at 2½ miles north of Skincuttle inlet, are not more than a quarter of a mile wide, and here the channel is crooked, and obstructed by rocks and shoals, having from 6 to 8 feet at low water. The tides, however, are not strong, but it cannot be recommended as a passage for any craft larger than a boat or canoe. Just south of Dolomite narrows, from the west side of the strait, opens Bag harbour, expanding within to a basin nearly one mile in diameter.

The Twins.—Nearly abreast of Dolomite narrows, on Burnaby island, are two conspicuous mountains estimated at 1,500 feet in height.

Island bay, at 1½ miles North of the narrows, extends westward, and is 2 miles deep. It was so named from the number of small islands in it, about 17, and is probably too rocky for a safe harbour.

Skaat harbour, at the north end of Burnaby strait, is a bay 2¾ miles wide, with a depth of about 3 miles. Wanderer island and several smaller islets lie off the entrance. The harbour turns into a narrow inlet in its upper part, and terminates among high mountains forming a portion of the axial chain of the islands. Skaat harbour has not been sounded or carefully examined, but from the character of its shores it would be likely to afford good anchorage, especially westward of Wanderer island, and if so, it is the best for large vessels in this vicinity. The harbour will

probably be found deepest on the Wanderer island side, as there is an extensive field of kelp off the opposite shore.

All Alone stone and Monument rock form good marks to the northern entrance of Burnaby strait, near which lies the entrance to the harbour. The entrance to Skaat harbour on the southern side of Wanderer island is very narrow; at the angle formed between it and the shore of Burnaby strait are two small coves affording anchorage for a small vessel, but with wide tidal flats at their head, which a short distance beyond low-water mark fall away rapidly into deep water.

Limestone rock is a dangerous reef, dry only at low water, but not extensive, though a second rock, also only dry at low water, lies a short distance south-east of it. The eastern point of Wanderer island, in line with that of Centre island, leads clear of Limestone rock, one mile to the southward of the second rock.

Huxley island, at the northern entrance of Burnaby strait, is nearly 2 miles long north and south, and about 1¼ miles broad; it is bold and remarkable, rising rapidly from the beach to a height of 1,500 feet. Abreast the north-west point of the island, in mid-channel, a cast of 70 fathoms was obtained, with a fine sandy bottom. At 4 miles north of Dolomite narrows, the passage between Huxley island and the north-west end of Burnaby island leads into Burnaby strait.

Burnaby island.—The north shore of Burnaby island, 5¾ miles in length N.E. and S.W., is nearly straight on the whole, though with a few shallow bays, one of which is called Section cove.

Alder island lies about the centre of this stretch of coast; it is about half a mile in diameter, nearly flat, with probably a good anchorage behind it, which should be approached from the north, as Saw reef runs out from the shore of Burnaby island to the eastward, and this part of the coast is broken and rocky, with large fields of kelp extending from it. The hills on the north side of Burnaby island are estimated at 300 to 500 feet in height.

Scudder point.—From Scudder point, the north-east point of Burnaby island, the east side of the island trends southward, allowing the outer of the Copper islands to be seen. A considerable width of low land stretches back from Scudder point, covered with an open growth of large but gnarled spruces. Little beaches of coarse gravel fill the spaces between the low shattered rock masses, apparently caused by the action of a heavy surf. In a cove on the north side is a strongly built but abandoned Indian house. North of Granite point is a deep bay with a high island lying in the mouth of it.

JUAN PEREZ SOUND has at its entrance between the north of Burnaby island, and Ramsay island, a width of 8 miles. The sound extends westward, a number of smaller inlets and bays, branching off from it, and is continued in a more northerly direction by Darwin sound, by which it communicates with the upper ends of the long inlets which extend westward from Laskeek bay. From the centre of a line joining the outer entrance points to the southern entrance of Darwin sound, Juan Perez sound is 13½ miles in length.

On its south-western side are Werner bay, Hutton inlet, and De la Beche inlet, which terminate in narrow channels or fiords, extending among the axial mountains of Moresby island, and which have not been examined to their heads. From Werner bay two small inlets branch. Hutton inlet appears to be about 3 miles long; De la Beche nearly 6 miles, with a low valley, hemmed in by hills on either side running north-westward from its extremity. None of these openings seem to be well adapted for harbours, as the shores are bold and rocky, seldom showing beaches, and the water to all appearances too deep for anchorage.

Bischoff islands, lying in the north-west part of Juan Perez sound off the south side of Lyell island, are low, but densely wooded. There is sheltered anchorage for small craft between the two larger islands, but it must be entered from the westward, and with much caution, owing to the number of rocks and sunken reefs which surround it.

Sedgwick bay, about 3 miles deep, on the south shore of Lyell island, is too much exposed for a harbour, as southerly winds draw directly up Juan Perez sound.

Ramsay, Murchison, and Faraday islands are the largest of a group of islands forming the north-east side of Juan Perez sound.

Ramsay island is 2¾ miles in length east and west, has bold hills rising in the centre, and is densely wooded. Its south shore is high, with some rocky cliffs; two small islets lie off the north-east side, which is rugged and composed of solid rock. The north-west shore has several coves, but none suited for anchorage.

Murchison island is 2½ miles long; and Faraday island nearly 2 miles; both are low.

Between Ramsay and Murchison islands is a small group composed of Hot Spring, House, and a few smaller islets and rocks. On the south side of Hot Spring island is the spring from which it has its name. Its situation is easily recognised by a patch of green mossy sward which can be seen from a considerable distance; steam also generally hovers over it. The temperature is so high that the hand can scarcely bear it with comfort. The water has a slight smell of sulphuretted hydrogen, and a barely

perceptible saline taste. The Indians bathe in a natural pool in which the waters of one of the streams collect.

Anchorage.—Between Hot Spring and House islands is a good anchorage for small craft, sheltered on all sides but the north.

Tar islands.—Extending northward from the end of Murchison island is a chain of small islands about 4 miles long, named the Tar islands, as the Indians report that on one of them bituminous matter is found, oozing out among the stones on the beach. Agglomerate island, the southernmost has apparently been burnt over, and is covered with standing dead trees. These islands are only approximately placed on the chart. Northward of them lies a single low island with a few trees on it, named Tuft island.

Rocks dry at low water lie between Faraday and Murchison islands, and there are several small rocky islets and low-water rocks in the vicinity of Hot Spring and House islands.

Entering Juan Perez sound.—Vessels entering the sound had better do so to the southward of Ramsay island, till the narrower channels have been surveyed. No bottom was reached with 94 fathoms of line in the centre of the sound south of Ramsay island, nor at about one mile south-east of the extremity of Bischoff island. The water is apparently deep throughout, but it has not been sounded.

LYELL ISLAND, about 15 miles in diameter east and west, and 9 miles north and south, is separated from Moresby island by Darwin sound. The island is composed of hilly land, mostly rising at once from the shore to heights of 600 to 900 feet, and attaining towards the centre of the island a height probably exceeding 1,000 feet. It is densely wooded, and on the low land has some fine timber. The east coast has not been surveyed. A tli inlet, on the north side of Lyell island, has not been examined; it is about 3 miles deep, with two main arms, and does not appear to be a good harbour.

Halibut bank.—About 3 to 4 miles E.N.E. from the north-east point of Lyell island is Halibut bank, with 23 fathoms water on it. This is probably the same bank H.M.S. *Alert* got 37 fathoms on.

DARWIN SOUND lies between Lyell island and the west shore of Moresby island, and from its southern entrance to White point is 12 miles in length north-west and south-east; in width it is irregular, but it is a fine navigable channel. In the south entrance no bottom was found at 94 fathoms. When entering from the southward, Shuttle island appears to be nearly round. The channel on its eastern side should be followed, as this seems to be quite free from impediments. Abreast the north end of

Shuttle island in this channel a cast of 18 fathoms was obtained. A mile beyond this point, and in mid-channel, is a low rock which is not readily seen, with a second, uncovered only at low water, a short distance to the north of it.

Tides.—The flood sets up Darwin sound from the southward into the various inlets, and then eastward to the open sea again by Richardson and Logan inlets. The ebb in like manner draws through from end to end in the opposite direction. The tidal stream runs at the rate of 2 knots at the strongest.

Bigsby inlet.—The south-west side of Darwin sound for 5 miles from the south entrance is rocky and broken, with several coves and inlets. At that distance is Bigsby inlet, extending 2½ miles in a westerly direction. It is a gloomy chasm, scarcely half a mile in width, and surrounded by mountains probably as high as any in the islands. These rise steeply from the water, sometimes attaining in the first instance a height of 3,000 feet, and are in places nearly perpendicular, but are mostly well wooded. Further back, especially to the southward and westward, massive summits of bare granite rise to a height of 4,000 to 5,000 feet with their gorges filled with drifted snow fields. The inlet is almost void of anything like a beach.

Shuttle island, though low, is rocky. The channel to the west of it is probably deep enough for vessels of any class, but should not be used until surveyed. There is a rock, covered at high water, on the west side of its northern entrance.

ECHO HARBOUR.—At 1½ miles northward of Shuttle island, and opposite the inner end of Richardson inlet, is Echo harbour. The passage into the harbour runs southward about one mile, and is surrounded by high hills which, towards its head, rise to rugged mountains. The outer part of the entrance has a depth of 10 fathoms in it, the sides then approach, leaving a channel scarcely 300 yards wide between abrupt rocky shores.

In the harbour proper the depth is everywhere about 15 fathoms, decreasing gradually toward the head for a short distance, and then running steeply up to a flat which is partly dry at low water, and above high-water mark forms a narrow grassy beach. The bottom is soft mud, and excellent holding ground. A very narrow passage leads westward from the bottom of the harbour into a secluded basin, scarcely a quarter of a mile in diameter, which, with the exception of a channel in the middle, is nearly dry at low water. Into its head flows a large brook, coming from the mountains to the south-westward.

KLUN KWOI BAY.—At 2 miles west of the entrance to Echo harbour, the shore line falls back in Klun kwoi bay. The bay runs up in several arms, which have not been carefully examined, among the bases of rugged snow-clad mountains, which rise steeply from the shores, or at the sides of the valleys, by which the heads of the inlets are continued inland. The highest peaks are probably 5,000 feet or more in altitude. The mountains of Moresby island appear to culminate here, and are not such a prominent feature further southward. To this part of the range Perez's name of Sierra de San Christoval may be applied with the greatest propriety. The head of the bay approaches the southern arm of Tasoo harbour on the western side of Moresby island to within a couple of miles.

CRESCENT INLET may be considered as forming the extension of Darwin sound northward. It turns gradually through nearly half a circle from a north-west bearing to a direction nearly south-west, and is over 4 miles in length. It is a fiord, with steep mountains and wooded sides, but probably not so deep as most similar inlets, as there are stretches of beach of some length. It is not known if the Indians have any trail across to Tasoo harbour, to which, if correctly placed, the distance across cannot be great. Red top mountain, partly bare and about 3,000 feet high, is the most conspicuous peak in the vicinity, rising on the north side of the inlet, at the angle of the bend.

LASKEEK BAY is the name given to the wide indentation of the coast between the north-east extreme of Lyell island and Vertical point, the south-east point of Louise island, bearing N.W. and S.E. from each other, and 10 miles apart. From Laskeek bay four large inlets extend westward; of these the two southern, Richardson and Logan inlets, open into the head of Darwin sound.

The two northern inlets, Dana and Selwyn, communicate at their heads with the head of Cumshewa inlet to the northward.

Richardson inlet is about 11 miles in length in a W.S.W. and E.N.E. direction, with an average breadth of 1½ miles, and is straight, with moderately bold shores. The southern side is formed by Lyell island, A tli inlet being just within the entrance, and Dog Island about 5 miles within it. Kun ga, Tan oo, and Inner islands, from east to west, form the northern side. Kun ga island is about 1,500 feet high, and forms a good mark for the entrance; there is a low rocky reef some distance eastward of the outer point of Kun ga, and a second off the south shore of the same island. Near Dog island there are several small islets and rocks; and at about 3½ miles west of it, on the south side of the inlet, is a cove, where a small vessel can find a convenient anchorage,

probably the nearest stopping place to Laskeek village. The channels between Kun ga and Tan oo and the latter and Inner islands are probably deep, though the first should be navigated with caution, and care taken to avoid the east end of Tan oo island, as several rocks and patches of kelp lie off it.

Laskeek or Klue Indian village is situated on the eastern extremity of Tan oo island. It is one of the most populous still remaining in the Queen Charlotte islands.* The village, extending round a rocky point, faces two yaws, which prevents its being wholly seen from any one point of view. The western end of Richardson inlet is contracted to a width of about a quarter of a mile, and obstructed by a small island and several rocks.

The Tide runs through this passage with considerable strength, and it is unsuited as an approach to Echo harbour, though the most direct way in from the sea.

Logan inlet is about 7 miles in length, and nearly parallel to Richardson inlet, with Flower Pot island, a small bold rock, covered with trees, off its mouth. One other small island lies close to the shore on its southern side, but it is otherwise free from obstructions, and constitutes a fine navigable channel, the best approach to Echo harbour.

Vessels should enter to the north of Flower Pot island, and keep in the centre of the channel. Kun ga island, as already mentioned, is high. Ti tul island, small and with low limestone cliffs, lies northward of it. Tan oo and Inner islands are also bold, rising to rounded hills of nearly uniform height of about 800 feet. They have some good gravelly beaches, though mostly rocky.

Timber.—In the inlets in the vicinity of Lyell island there is a considerable quantity of fine timber, trees of great stature growing in all moderately level and sheltered places.

Dana inlet runs about S.W. by W. nearly 8 miles, with bold shores; at its entrance is Helmet island, small, rocky, high, and of rounded form. A second small island is near it, and from most points of view the channel between the two is not seen, and care is necessary not to mistake this island for Flower Pot island, at the entrance to Logan inlet. At its western extremity Dana inlet turns northward, communicating by a narrow but apparently deep passage with Selwyn inlet, and thus cutting off Tal un kwan island from Moresby island.

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* H.M.S. *Alert* anchored off this village in 11 fathoms, about 2 cables east of the village. This anchorage is not a good one, being exposed to N.W. and S.E. winds, and is steep close-to. On anchoring, the houses should not be brought to bear south of West, as patches of rock stretch out two-thirds the distance across to the opposite shore from Laskeek point, so that going or coming from the north the east shore should be kept well on board, it being steep-to and quite safe. In the season, kelp marks the patches.—Navigating Lieutenant A. F. Boxer, 1860.

Tal un kwan island is 8 miles long, and 2 miles broad; the hills are rounded in form, and from 800 to 900 feet high.

SELWYN INLET* is nearly parallel to Dana inlet and about 10 miles in length, and near its head, turning northward, runs in that direction for a like distance, forming at high water a passage for canoes into the upper part of Cumshewa inlet, and separates Louise island from the main shore. The passage is narrow and walled in on both sides by mountains which rise very steeply from it. Entrance island is small and lies off the north entrance point with a low rock about one mile eastward of it. With the exception of a small rock about the middle of Tal un kwan island and near the south shore, the inlet appears to be free from dangers.

After giving the islets off the north entrance a wide berth, a vessel should keep the north shore for a distance of 5 miles until the entrance of Rock-fish harbour is reached.

Rock-fish harbour is formed by a boot-shaped projection of low land, at the angle of Selwyn inlet, and extends in a W.S.W. direction for about 1½ miles, with a width of half a mile, and an average depth of 15 fathoms. It is a secure and well sheltered anchorage, more easily entered than Cumshewa.

The head of the west branch of Selwyn inlet cannot be more that 9 or 10 miles from Mitchell or Gold harbour (on the west coast), as a low valley runs some distance westward. At about 3 miles from the entrance of the passage leading to Cumshewa is the opening to an inlet about 3 miles deep in a south-west direction, approaching to within 4½ miles of Mitchell harbour. These upper arms of Selwyn inlet are environed by high and rugged mountains.

Reef and Low islands are situated in the outer part of Laskeek bay. The southern and first named is steep along the water's edge, and a reef runs off about half a mile to the southward from it. Their exact position is not known.

LOUISE ISLAND is about 15 miles long east and west, and 8 miles broad, with high mountains, and doubtless the snow on them lasts throughout the summer. From Selwyn inlet the east coast of the island trends north-eastward 8 miles, with several small bays, fully open to the sea, and mostly rocky.

Vertical point, the northern entrance point of Laskeek bay, projects at about half-way along this stretch of shore, and is remarkable from the shape of the beds of grey limestone of which it is composed, aggregating

* *See* Admiralty plan :—Selwyn inlet on sheet of Ports in Queen Charlotte islands, No. 2,168; scale, m = 0·5 of an inch.

at least 400 feet in thickness. North of the point are the two small Limestone islands, behind which the tide, running southward along the coast, forms a race on the ebb.

Skedans bay, about 2 miles from the entrance to Cumshewa, is strewn with sunken rocks and fully open, and should on no account be entered by vessels. A large stream enters its head, which can be seen at some distance inland forming a high waterfall, and which, according to the Indians, flows out of a lake of some size, high among the mountains. Skedans village forms a semi-circle round the head of a small bay or cove, very rocky, which indents the south side of a narrow isthmus, connecting two remarkable nipple-shaped hills with the main shore. This peninsula is situated at the south entrance point to Cumshewa inlet, and between it and the Skedans islands, the tide forms a race. Skedans islands distant 3½ miles from the shore, are low and covered with trees.*

CUMSHEWA INLET† is a long inlet extending about 15 miles westward, with a prolongation southward connecting it with Selwyn inlet. It differs in the low character of the land on its northern shore from the inlets to the south, and marks the junction, on the east coast of the islands, of the mountain region and flat country. There is more beach along the shores than in the southern inlets, and wide tide-flats, indicating shoaler water, which is not only found in the inlet itself, but extends off the coast. Towards the head of the inlet, the shores are quite bold in some places, and the water probably deep.

In the entrance of Cumshewa inlet, to the north of Skedans islands are depths of 20 fathoms, with a shell and gravel bottom. Off the north point of entrance, Cumshewa island, a small barren rock, and the Cumshewa rocks, extend in a south-easterly direction nearly 1½ miles. A vessel coming from the north should, therefore, keep well off the shore till the rocks are passed, and then stand in to the entrance in a north-westerly direction. On the outer point near Cumshewa island are the ruins of an abandoned village.

Kin gui island, just within the north entrance point, on the north side of the inlet, is covered with dead trees, and can be recognised easily. At about one mile within the entrance, an extensive shoal, on which the sea breaks heavily, runs off from the south shore, leaving a channel about half a mile wide between it and the north shore of the inlet. The passage in is through this channel, in which it is reported there are depths of 7 and

* H.M.S. *Alert* when on her passage from Laskeek village to Cumshewa inlet passed inside the islands to the northward.—Navigating Lieutenant A. F. Boxer.

† *See* Admiralty plan :—Cumshewa inlet, on sheet of Ports in Queen Charlotte islands, No. 2,168; scale, *m* = 0·5 of an inch.

8 fathoms. The southern point of a peninsula which projects from the northern shore of the inlet, bearing S. 88° W., just clears the northern edge of the shoal. A few patches of the shoal dry at low water, but the greater part is indicated only by the kelp which grows thickly on it during the summer. The tides run strongly in the mouth of the inlet.

McKay cove.—Within the narrows, on the north shore, is a cove, where a small house for the purpose of trade was built, but is now abandoned. The shore dries out for some distance at low water, but off it a small vessel may find a pretty secure anchorage, though the tide sweeps round the cove.

Cumshewa village is also situated on the north side of the inlet, about one mile westward of McKay cove, the houses being built along the shore of a bay facing south eastward, 3¼ miles within the entrance. A small rocky islet, connected with the main at low water, lies off it.

Anchorage.—The best anchorage for a large vessel is probably to be found on the south side, nearly opposite the peninsula before alluded to, and abreast a stretch of low land, eastward of a stream.

The COAST.—From the entrance to Cumshewa inlet, the coast runs north-westward to Spit point, the south point of Skidegate inlet, a distance of 17 miles. It is indented by two considerable bays. Copper bay—the northern—about 5 miles from Spit point, received its name from some copper works which were carried on there at one time. The land is low, and very different in appearance from that of the coast southward. The projecting points are mostly low and flat, and formed of gravel deposits. With the change in the character of the land, the beach becomes flat, and shoal water extends far off shore, the depths shoaling from 10 fathoms at 3 miles off Cumshewa island, to 6 and 7 fathoms at 7 miles off Spit point. Near Cumshewa the beaches are almost entirely composed of boulders, but show more gravel and sand toward Skidegate. The surface of the country is densely wooded with trees of large size.

Cape Chroustcheff,* 2 miles to the southward of Spit point, should not be passed nearer than 5 miles; the cape is low and dark-looking. Coming from the southward, it shows very conspicuous; when abreast of it, Spit point, the low south point of Skidegate, becomes visible.

SKIDEGATE INLET,† separating Moresby from Graham island, forms a spacious harbour communicating with the Pacific at Buck point, south of Cartwright sound, by an intricate channel, only navigable for canoes a portion of the way. Skidegate inlet from its entrance extends in a south-westerly direction for about 9 miles from the Bar rocks, where it

* Navigating Lieutenant A. F. Boxer, H.M.S. *Alert*.

† *See* Admiralty plan :—Skidegate inlet, No. 48; scale, *m* = 1·0 inch. Information by Navigating Lieutenant D. Pender, in charge of the Admiralty Survey, 1866.

contracts to a width of 1¼ miles between Image point and Flowery islet on the north side of Alliford bay. Within these points it opens again, forming two expansions, separated by Maude island. That part of the northern expansion eastward of Lina island forms Bear Skin bay; the part westward of the island has several islands in it, with Anchor cove in the western end. Beyond Anchor cove it turns north-west, forming Long Arm; the total length of the inlet from Bar rocks to the head of Long Arm being about 21 miles. The southern expansion forms South bay, in which is South island, its western side passing into Skidegate channel and thence to the Pacific.

The shore of Skidegate inlet are not so bold as those of the fiords to the south, and are mostly fringed with a beach of greater or less width. The surrounding country is densely wooded, and where the land is flat, timber of magnificent growth is found. This inlet would be convenient in many respects as a site for saw-mills.

Spit point is low and wooded, and composed of sand deposits, which, extending northward, form the bar which stretches across the entrance to Skidegate inlet.

The bar or spit, with from one to 3 fathoms water on it, extends in a north-westerly direction for about 9¼ miles to within nearly 1½ miles of Lawn point, the northern point of entrance. The spit slopes off very gradually seaward, while toward the inlet it rapidly deepens to 20 or 30 fathoms.

Bar rocks, on the outer edge of the spit, 2½ miles from its extremity, are two in number; the western one dries 5 feet, and lies 6¾ miles N.W. ⅝ N. from Spit point; the outer or eastern rock dries one foot at low water and bears N.W. ⅞ N. the same distance from Spit point: 4 cables N.E. by E. from the inner rock; and 3 miles N.E. ½ E. from Dead Tree point. The sea does not always break on these rocks. Lawn point, bearing W. ¾ N., leads to the northward of Bar rocks.

The Bar rocks are situated in latitude 53° 22′ 45″ N., longitude 131° 50′ 20″ W.

Lawn point* is generally green, with a small sand cliff and a large boulder in front of it; a hill 500 feet high rises immediately to the westward of the point. The coast southward of Lawn point is flat for 10 miles to Village bay, and is covered with standing dead trees.

Dead Tree point, 3¾ miles to the southward of Lawn point, is a projecting part of the coast, but otherwise is not conspicuous.

Village islands, in front of Village bay, form good marks for Skidegate inlet; the northern one (Bare islet), 125 feet high, is almost bare, and the other (Tree islet), having trees upon it, is 153 feet high.

* Lawn point is not easy to distinguish when the grass is dried up, and Dead Tree point can only be seen as a tangent when on a north or south bearing.—Navigating Lieutenant E. S. Clapp, R.N., H.M.S. *Scout*, August 1872.

The village of Skidegate, nearly half a mile in length, is situated in the bay, off which are the Village islands, and consists of many houses, with the usual carved posts, fronting the beach.

Village bay is a good stopping place; anchorage may be taken up between Bare islet and the beach in 14 fathoms. It is, however, exposed to S.E. winds. Should one of these gales spring up, good shelter will be found in Alliford bay.

Image point.—In the cove at Image point some rude buildings have been erected in connection with the dog-fish fishery, and in 1878 some persons were engaged in it. The trees in the vicinity are chiefly Menzies spruce, yielding a white wood of moderately fine grain.

Alliford bay, on the south side of the entrance, is an excellent anchorage, with good holding ground, in about 9 fathoms. The passage between Flowery islet and the North point of the bay, should not be used. Wood and water may be obtained.

Anchor cove,* situated 10½ miles from Village islands on the north side of the inlet, affords anchorage in 5 fathoms. This is the place of export for the anthracite coal, found on both shores of the inlet, but principally on the sides of mount Seymour, one mile to the northward of the cove. The coal has been mined, a small railway being laid to Anchor cove.†

Observation spot, on North point, Anchor cove, is situated in latitude 53° 12′ 31″ N., longitude 132° 14′ 19″ W.

Slate Chuck brook is the largest stream in Skidegate inlet, its mouth being about one mile north of Anchor cove. The brook receives its name from a quarry a few miles up its course, where the Indians obtain the dark shaly material from which they make carvings. In former years communication used to be kept up with the head of Masset inlet to the north by means of this stream, part of the distance being accomplished in canoe and part on foot.

Leading island, 3½ miles southward of the bare Village island, forms the western part of Alliford bay at the southern entrance to Skidegate inlet; it is 400 feet high and appears round.

Maude island, at the junction of the north and south expansions of the inlet, is nearly 4 miles long, S.W. and N.E., 1½ miles broad, and 1,260 feet high. On the west end of the island the Indians belonging

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* *See* plan :—Anchor cove on Admiralty chart, No. 48; scale, *m* = 12 inches.

† Cowgitz coal mine is about a mile in a N.N.E. direction from Anchor cove. The Queen Charlotte Coal Mining Company was formed in 1865 to open up the deposits of anthracite which had been discovered here, and abandoned in 1872. In 1869 about 800 tons of coal were extracted, and a portion of it shipped to Victoria.

to Gold harbour (on the west coast) have established a village, on ground purchased from the Skidegate Indians. The Gold harbour Indians still preserve their rights over that region, and live there much of the summer but find it more convenient to have their permanent houses near Skidegate.

SKIDEGATE CHANNEL extends from South bay for 15 miles to the Pacific. From South bay to Log point, a distance of 8½ miles, the channel is contracted, particularly in the East and West narrows, the former in one part being only 200 feet wide, and the latter 2 cables. The tides from east and west meet about the East narrows, running through the channel with great strength, probably 5 knots in several places. The narrows must be passed at slack water of high tide, which lasts for a very short time, so that both narrows cannot be got through in one tide.

Directions.—A deep channel into Skidegate inlet may be found northward of Bar rock spit by steering for Lawn point on a S.W. bearing until within about a mile of the point, when the water will deepen to 15 or 20 fathoms; from this point a general S.S.E. course may be steered, paying great attention to the soundings, until the west side of Leading island comes in line with the east side of Bare island, bearing South.

* From the north-eastward Lawn point makes like a bluff sloping towards the north. Large ships should bring Lawn point to bear S.W. and steer for it; the water will gradually shoal from 10 and 12 fathoms at 4 miles off, to 5 and 4½ fathoms at about one mile from the point, when it suddenly deepens to 12 and 20 fathoms. From this position, Welcome point, which appears as a low and grassy patch under Table mountain (but is difficult to distinguish), should bear S. by E. ¾ E. If it does not, bring it on that bearing and exactly in line with the left tangent of the highest part of Table mountain. This will lead in between the Bar rock spit and the shoal extending from Lawn point to Dead Tree point, and up to the leading marks. This course will lead very close to the north-west point of the Bar rock spit, if not over the extremity of it in 3 fathoms at low water The deep portion of the channel from opposite Lawn point till past the north-west point of Bar rock spit (or until the Boulder at Lawn point bears W. by N.) is only one-third of a mile wide; attention to the lead and steering, with a sharp look out, is therefore necessary, for, as previously remarked, Welcome point is not readily distinguished.

The west side of Leading island, in line with the east side of Bare Village island bearing South,† leads over the Bar rock spit, to the northward of

* Navigating Lieutenant A. W. Miller, H.M.S. *Amethyst*, August 1876.

† *See* View on Admiralty chart, No. 48.

the rocks, in 15 feet at low water, from whence the depth is from 20 to 30 fathoms to Village islands; passing to the southward of these islands anchorage may be found in the north-east side of Bear Skin bay in 12 fathoms, or, to gain shelter from a south-east gale, Alliford bay is recommended.

Coasting vessels with local knowledge use a passage with 3½ fathoms over the spit, about one mile south of the Bar rocks (when they are visible), by keeping Dead Tree point bearing W.S.W. until the leading mark comes on.

Approaching Skidegate inlet the water should not be shoaled under 6 fathoms at low water until Lawn point bears S.W. or the leading marks are on.

Tides.—It is high water, at full and change, in Skidegate inlet at 1 h.; springs rise 17 feet, neaps 14 feet.

The COAST.—From Lawn hill, near Lawn point at the entrance of Skidegate, to Rose point, the north-east extreme of Graham island, the distance is about 48 miles. The coast line is straight and open, with no harbour, and scarcely a creek or protected cove for canoes or boats for long distances. The beach is gravelly and sometimes stony to the Tl ell river beyond this it is mostly sandy to Rose point. For many miles northward cliffs of clay and sand are found alongshore, and for about 17 miles northward of Tl ell river these frequently rise into cliffs 50 to 100 feet in height. North of the range of cliffs the shore is almost everywhere bordered by sand-hills, which are covered with coarse grass, beach pea, &c., and would afford fine grazing for cattle. Behind these are woods, in some places burnt, and the trees generally scrubby. This part of the coast is also characterised by lagoons, and is evidently extending seaward, by the banking up of the sand under the action of the sea. The largest lagoon opens out at cape Fife about 6 miles to the southward of Rose point, extending southward for some miles, and is reported by the Indians to communicate with a second further inland. The mouth of this lagoon forms a safe harbour for boats or canoes at high water, but is nearly dry at low water.

The coast between Skidegate and Rose point having dangerous flats extending off it, which have not been examined, should be given a berth of 6 or 7 miles, and the lead kept constantly going whilst running along it, the depths varying from 9 to 11 fathoms.

TL ELL RIVER enters the sea at 10½ miles north of Lawn point, and is a stream of some size. For about 3 miles above its mouth it runs nearly parallel to the shore, separated from the sea by a low swampy strip of land only about half a mile in breadth. This land is of comparatively

modern formation, being composed of sand and gravel, and is partly covered with spruce trees of no great size. A ruined Indian house stands about 3 miles south of the mouth of the river. The water of the river is of a dark coffee or amber colour.

Cape Ball (Kul tow sis), nearly 20 miles from Skidegate bar, is very conspicuous, having a remarkable white cliff on it, with lower cliffs on both sides; it cannot be mistaken. The Indians report that at very low tides patches of clay dry a long way off from the cape. In the bay North of cape Ball are the remains of an Indian village.

Rock.—A rock with 2 fathoms on it, lies about 6 miles East from cape Ball.*

Cape Fife.—Near this cape on some parts of the shore magnetic iron sand is abundant, with numerous colours of gold in it. There is anchorage off the cape with off-shore winds; in this neighbourhood the lead must be most carefully attended to.

ROSE POINT, the north extreme of the Princess Charlotte islands, so named by Douglas in 1788, is known to the Haida Indians as Nai koon, or long nose. It is a remarkable low promontory, apparently formed by the meeting of the currents and waves from the southward and westward round this corner of the island. The inner part of Rose point, near cape Fife, does not differ from the low wooded coast to the south; the Indians say there are many lakes and swamps inland. Further out, where the point is narrower and more exposed, it is clothed with small stunted wood, which in turn give place to waving grass-covered sand-hills. Beyond this the narrow gravelly point is covered above high-water mark with heaps of drifting sand, and great quantities of bleached timber, logs, and stumps, piled promiscuously together. The apex of the point is a narrow steep-sided gravelly bank, which extends for a long distance at low water.

A dangerous spit extends off Rose point in a north-easterly direction, for, it is said, a distance of nearly 5 miles, but its exact extent has not been ascertained.† The point should, therefore, especially in dark or thick weather, be given a wide berth. Several vessels have been lost on Rose point, which is a dangerous and treacherous point to round at any time, except in fine clear weather, and many Indians have been drowned there on different occasions.

Captain R. Brundige remarks :—"I examined Rose Spit and found a "strong current of about 2 knots. This spit or sand-bank extends out

* Captain McNeill, of the Hudson Bay Company's service.

† H.M.S. *Rocket* struck soundings in 7 fathoms at least 3 miles from the end of the spit, over which the sea was breaking heavily, and which has four or five sandy hillocks on it.—Lieutenant C. S. Nedham, R.N., H.M.S. *Rocket*, 1873.

"about 4 or 5 miles, with boulders and timbers, or large trees buried in "the sand. Soundings were found to be gradual, from 40 fathoms down "to 5 fathoms close alongside; also good even sounding all the way to "Masset with sandy bottom. Ships could anchor under Invisible point "in a south-easterly gale in 5 to 8 fathoms."

Rose point is situated in latitude 54° 11′ 30″ N., longitude 131° 36′ W.

HECATE STRAIT, between the Princess Charlotte group and the mainland of British Columbia, is 75 miles wide at its southern entrance, gradually narrowing to 25 miles between Rose Spit (Graham island), and the Butterworth rocks on the eastern side of the strait. In the fairway of the south-east part of Hecate strait the water is deep. From Skidegate across to within 10 miles of the mainland, in a north-east direction, the depths are from 8 to 25 fathoms; in some cases, growing kelp was passed through by the surveying vessel *Beaver* (1866) in 8 and 13 fathoms.

With the centre of Zayas island bearing N. by W. ½ W., and the north extreme of Stephens island E. by N. ¾ N., the depth is 15 fathoms. This bank of soundings was found very useful on one occasion, during a strong breeze from the south-east, with thick weather, when H.M.S. *Virago* anchored on it and remained until it cleared up, and the land became visible.

Northward of a line drawn from Skincuttle inlet, across the strait to Banks island, the depth does not exceed 100 fathoms, and is generally much less. A similar shallow area borders Graham island to the north, and it is also probably comparatively shallow for some distance off the west coast of the northern part of the same island. From the vicinity of Masset a bank of sand not exceeding 20 fathoms extends to the north and east, trending with Rose Spit, and on the east side of the island extending towards Cumshewa, its eastern margin reaching the middle part of Hecate strait. The average depth of water is from 7 to 10 fathoms, but there are much shoaler parts. This bank was named Dogfish bank by Ingraham in 1791. Near its eastern edge he places, in latitude 53° 50′ and about 30 miles S.E. (true) from Invisible point, a rock or shoal on which the ship *Margaret* struck in 1792 drawing 13 feet. Near the spot he notes 3 fathoms, deepening to 5, 7, and 12 fathoms eastward.

Shoal.—In lat. 53° 26′ N., long. 131° 6′ W., approximate, a shoal has been reported, but its position is doubtful.

Tides.—In Hecate strait, the flood tide sets to the northward. In Dixon entrance, the flood coming from the westward round North island, sets along the Masset shore, across Hecate strait for Brown passage, spreading for about 15 miles round Rose point, towards cape Ibbetson (Edye passage), where it meets the flood from the southward; consequently

between Rose point, cape Ball, cape Ibbetson, and thence south-east 15 or 20 miles, the tides are irregular.

The direction and rate of the tidal streams are not regular, being greatly influenced by the winds. At full and change they run with great strength. Time of high water over the strait generally is about 0h. 30m.

Between cape Murray, Percy point, and Zayas island the tides are the strongest and most irregular, causing a heavy and confused sea, so much so, that in bad weather it has the appearance of breakers.

ROSE POINT to MASSET SOUND.—The shore between these two places forms a bay 22 miles in width. With the exception of a few small rocky points, the beach is smooth and regular, and almost altogether composed of sand, with gravel in some places, sloping steeply above the ordinary high-water mark. Low sand-hills generally form a border to the woods which densely cover the land. The water is shoal far off the shore, especially at 15 miles from Rose point, and on approaching Masset sound, where kelp forms wide fields at a great distance from the beach. In the north-east part of the bay there is anchorage with off-shore winds.

Hi ellen river, at 9 miles south-westward from Rose point, is a stream of some size, which is frequented by great numbers of salmon in the autumn. Its mouth forms a good boat harbour. On its east bank are the ruins of an Indian village, and on its west, Tow hill, an eminence remarkable in this low country, facing the sea with a steep cliff 200 feet high, composed of columnar volcanic rocks on one side, while the other slopes more gradually.

MASSET HARBOUR* is rather more than 22 miles S.W. ½ S. from Rose point, and should be approached by vessels with caution; the entrance is between a low point with a ledge of rocks covered with kelp, extending half a mile from it on the western side, and the point of a long spit partly dry (the surf usually breaking the whole length of it) on the eastern, the passage between having an extensive bar.

Just inside and round the eastern point of inner entrance is a pretty bay, with a beach, containing the principal village (Ut te was), off the centre of which there is anchorage in 10 fathoms. At this part the width of the harbour is nearly 2 miles, a large sand-bank filling up its western side. The ebb tide runs very strong, making this by no means a good anchorage.

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* *See* Admiralty plan:—Masset harbour, on sheet of Ports in Queen Charlotte islands, No. 2.168; scale, $m = 1{\cdot}75$ inches. This plan, however, must be used with caution, as it has been reported defective. In 1852 the Indians belonging to this place seized, plundered, and burnt an American schooner, the master and crew being spared through the influence of the chief Edensaw.

In 1878 the Hudson Bay Company had a post at Ut te was, the only one on the islands; the Church Missionary Society also had a station here which had been established two years. About one mile south of this place, also on the east shore, is a second village, and on the opposite side a third. They are all decaying, and have comparatively few inhabitants. Masset must at one time have been a populous place.

Masset is a bar-harbour with not less than 5 fathoms, and is easy to approach. I found good sounding all along the coast, and had 30 fathoms about eight miles off shore when the lead dropped into deep water. This whole coast is free from rocks, with a beautiful sand beach, and the current is not more than 1½ knots.—Report of Captain Brundige.

Directions.—With the outer western point bearing W. by N. one mile, the depth is 5 fathoms at low water; from this position the course in is about S. by E. ½ E., the depths over the bar varying from 5 to 3 fathoms, for about 3 miles, to abreast a village on the western shore, a little more than one mile from what may be termed the inner or proper entrance to the harbour; the water then suddenly deepens to 9 and 11 fathoms, the channel lying in the direction of the eastern point of what has been called the inner entrance, and the depth, at about 2 cables from the beach that forms it, being from 10 to 13 fathoms. A safe mark for going in to the outer anchorage is a small islet inside the channel in line with the outer eastern point bearing S.E. ½ E., or if the islet cannot be seen, a point will be seen open on that bearing. With winds from seaward the outer anchorage is uncomfortable owing to the tide keeping the ship swung across the swell.*

The land in the vicinity of Masset harbour is all low, no hills being visible.† It is for the most part densely timbered with fine spruce trees, but there are reports of prairies in the interior, which may not improbably be swamps. At 3 miles up the sound, a lagoon or arm runs off on the east side. At this place the land attains an elevation of 100 feet or more, spreading back in a flat or gently undulating plain at this level. Nearly opposite this place, on the west side is Maast island, which appears to have given its name to the entire inlet. It lies across a bay, which seems at first sight to offer better anchorage than that already referred to. The island is low and sandy, and a great part of the bay or passage behind it is dry at low water.

MASSET SOUND, from its seaward entrance to the point at which it expands to Masset inlet, is 19 miles long, and about one mile in average width, and, though slightly tortuous, preserves nearly the parallelism of its

* Lieutenant E. L. Lang, R.N., H.M.S. *Mutine*, 1883.

† The Hudson Bay Company's cattle have kept themselves, grazing on the open sand-hills in the vicinity of the coast, requiring no attention, summer or winter.

sides. The depth, ascertained in a few places, varies from 10 to 12 fathoms. A number of small streams flow into it, most of which, according to Indian reports, have their sources in small lakes. On the eastern side, at 4½ miles from the southern or inner end of the sound, where its trend is nearly south-west and north-east, a narrow passage runs off southward, joining the expanded portion of Masset inlet, and forming a large island, which is mostly lower than the surrounding country. This passage is partly dry at low water, and is occasionally used by the Indians in canoes.

At its southern end, the narrow part of the inlet, which has been called the sound, expands suddenly to a great sheet of inland water, 17 miles in length east and west, and in its broadest part 5½ miles. This, to the northward and eastward, is bounded by continuous low wooded land; and to the west and south by hills, rising in the distance to mountains, rounded in form and about 1,500 feet high.* The northern and southern shores are of even contour, and often bordered by wide shoals covered with boulders. The western half of the inlet is studded with islands, and it is rather irregular in outline, forming four large bays or inlets with intervening mountainous points. The shores here are steep, with narrow boulder beaches sloping down at once into deep water. About the heads of the inlets, and near the mouths of streams only, are small areas of flat ground found. Of these inlets, that which reaches furthest southward is called by the Indians Tin in ow e.

Tsoo skatli.—On the south side of Masset inlet, 5 miles from its eastern extremity, is a narrow passage, the mouth of which is partly blocked by islands, but which leads into a second great inlet known by the Indians as Tsoo skatli, or "the belly of the rapid." The largest of the islands in this passage is named Slip a ti a. Kelp grows abundantly in the channel on both sides of the islands, which therefore cannot be very deep. The tide runs through them with great velocity, especially at ebb, when in the western channel it forms a true rapid, with much broken water.

Tsoo skatli is 9½ miles in length, and from one to 2 miles in width. Its eastern side is formed of low land, while its south-western extremity is a long fiord-like inlet. In this inlet are many islands; the largest, Has keious, is nearly one mile in diameter and about 200 feet high. The eastern portion of the south shore is rocky, with many small islets off it. On the eastern side of Tsoo skatli, 2½ miles from its extremity, is Tow us tas in, a remarkable hill with a steep cliff on one side. The north-eastern part of Tsoo skatli has a depth of from 10 to 16 fathoms. The

* The natives in 1853 stated that several years ago ships (some having three masts) used to anchor here; and that in August halibut and salmon fill the whole place, while ducks and geese fill the air.

depth of the north-western part, about the centre between the large island and the mainland, was 23 fathoms in one place. That of the south-western arm is probably greater.

Ya koun river.—Many streams flow into these inlets; the largest is probably that which is known as Ya koun, and enters the south-eastern corner of Masset inlet, in the bottom of a shoal bay. About the mouth of the Ya koun are large sandy flats, dry at low water. It was formerly navigable for small canoes a long way up, and is reported to head in a large lake. This is the stream mentioned as forming a portion of the disused route from Masset to Skidegate.* On the west side of the bay at the mouth of this river are a few small houses, used during the salmon season.

The Ma min river joins the Tsoo skatli inlet at its east end, and has a wide delta flat about its mouth. It is navigable by small canoes for several miles, but is much obstructed by logs.

The Awun river, some miles west of the entrance to Tsoo skatli, may not be large; it is said to rise in a lake.

Ain river, entering Masset inlet from the north-west, is an important stream. There are several Indian houses which are occupied in the summer above its mouth. It is said to flow out of a very large fresh-water lake of the same name, the river itself being short. The lake is filled with islands, and in the winter is frozen completely over.

Tides.—The rise of a spring tide at the entrance of Masset sound was estimated at about 14 feet, but, owing to the length of the narrow sound, Masset inlet has a tide of from 8 to 10 feet only; and the second or Tsoo skatli still less, about 6 feet. On one occasion, it was high water at the entrance of Masset sound at 1h. 15m. p.m., while in the narrow entrance to Tsoo skatli, 23½ miles distant, the flood had just caused a reversal of the current at 0h. 20m. Owing to the great expansion of the upper part of Masset inlet the tide continues to run up opposite Masset for about 2½ hours after it is falling by the shore, whilst the ebb runs out for about 3 hours after the water has begun to rise on the beach.

MASSET to VIRAGO SOUND.—The coast between these two places is everywhere low and wooded, with occasional open grassy spaces, differing from the coast east of Masset, in being rocky or covered with boulders. No wide sandy bays occur, and the points are mostly of dark low rocks. The trees along the shore are not of great size and are interspersed with occasional grassy spaces.

* According to Indian account the distance to be traversed on foot, after proceeding up the river as far as possible, is about half a day's journey, across a mountainous neck of land, from the summit of which both harbours can be seen.

The water is shoal far off shore, with wide fields of kelp. The shore should be approached with caution, with the lead constantly going.

In a N.N.E. ½ E. direction from the east point of Virago sound, there are soundings for several miles; at 8 miles the depth was 52 fathoms, sand; at 5 miles off, the depths were about the same; at 2 miles there were 28 fathoms, sand, and the water then gradually shoaled in to the shore. In July 1853, great quantities of drift kelp were passed through.

Anchorages.—Between Masset harbour and Virago sound, which lies about 10 miles to the westward, there are some good anchorages, in which a vessel might remain a night instead of keeping under way, or cruising about with a south-east wind, and thick weather.

VIRAGO SOUND,* constituting the entrance to Naden harbour is 3½ miles wide between its outer points, capes Edensaw to the east and Naden to the west; and 2½ miles deep to the narrow passage (which is 1½ miles long and about half a mile wide) leading into the harbour.

To the northward of the narrows, the west shore between Mary point, the western entrance of the narrows, and Jorey point, a distance of 2 miles, is bordered by a flat extending to a distance of about half a mile, and on the opposite shore, from cape Edensaw to Inskip point, a shoal also extends about the same distance; from the latter point a spit runs off to the westward for three-quarters of a mile, with a depth of 2½ fathoms, contracting the channel, in which the least water is 3¼ fathoms, to a width of 4 cables. From Inskip point to George point, the east point of entrance to the narrows, the eastern shore is clear of danger.

The outer anchorage of Virago sound is sheltered from all winds to the southward of East and West. With two small wooded islets on the west side of the entrance, bearing S.W. by W. ½ W. one mile, cape Edensaw N.E. by E. ½ E. 2 miles, and the opening to the inner harbour S. ½ W. about 2½ miles, the depth is 5½ fathoms water, sand and shells; the shores are low and fringed with kelp, but the lead will be a safe guide, as the water shoals gradually towards the land.

A vessel can always get a pilot by firing a gun and anchoring for a short time, which it is recommended should be done. The Indian fishermen will come off and point out any danger that may be in the way for a small recompense.

The inner anchorage, opposite Kung village on the western side, just within the narrows, is in 10 fathoms, at about 2 or 3 cables distant from the shore. This village has been nearly abandoned for the new Ya tza village on the coast at about 4½ miles north-west of Virago sound. This site,

* *See* sketch of Virago sound, on Admiralty plans of ports, &c. in Queen Charlotte island, No. 2,168; scale, *m* = 0·5 of an inch.

though difficult to land at with northerly winds, has been chosen because the Indians can get more trade here, as many Indians come across from the north, a distance of about 40 miles, and there is a rather prominent hill behind Klas kwun point by which the canoe-men doubtless shape their course. The people were removing in 1870. Above Kung village a bank extends off the eastern side of the narrows nearly half-way across, leaving a channel along the western shore, with 7 to 10 fathoms water in it.

NADEN HARBOUR.—This capacious and land-locked harbour is about 4 miles in greatest length north and south, and 2 miles in width, with depths of 8 to 12 fathoms in it. Low land, densely wooded with spruce and hemlock of fine growth, borders the whole harbour. Rock appears on the shore only near the bottom of the harbour, and at Kung village in the narrows. The south-eastern shore of the harbour is low, with wide tide-flats; the north-western comparatively bold.

Naden river enters the harbour at its south-east corner, and is probably the largest river on Queen Charlotte islands. It flows from a large lake, which, according to Indian account, must be 10 miles or more in diameter, but is much encumbered by fallen trees, and its banks, except in a few swampy flats, are densely wooded. At high water a boat can proceed about 2 miles up. Stanley (Te ka) river in the south-west corner of the harbour is reported to be navigable for boats; and several smaller streams also enter the harbour. The spruce timber is excellent, and the harbour is well adapted for saw-mills and the export of lumber. In August, the Indians say that halibut and salmon are abundant, and geese and ducks come in large flocks.

Tides.—The rise and fall is about 13 feet.

VIRAGO SOUND to CAPE KNOX.—From cape Naden on the west side of Virago sound, the general trend of the shore is westward for about 17 miles to cape Knox, the north-western extreme of Graham island. The shore and country behind it are mostly low, though with some rocky cliffs of no great height, and the points are rocky, but wide gravelly or sandy bays intervene. Some rocks occur at a little distance off shore, but there is no appearance of a wide shoal belt like that found east of Masset. Klas kwun point, 4½ miles W. by N. from cape Naden, is a remarkable promontory, rising in the centre to a hill about 200 feet in height, which, owing to the flat character of other parts of the shore, is visible for a long distance. In a rocky bay to the east of the point, and open to the north-eastward, is Yat za village before described.

About half way between point North and the entrance to Virago sound, on a line connecting the two, captain Brundige obtained soundings in

65 fathoms at a distance of about 4 miles from the shore, and 30 fathoms close in to the shore at point North.

Jal un river.—Half-way from Klas kwun point to the east entrance of Parry passage is Jal un river. This stream is of no great size, but its mouth, in the bottom of a small bay, forms an excellent canoe or boat harbour at high water, and appears to be a favourite stopping place for travelling Indians. At 3 miles further westward is a small promontory, on the east side of which is another excellent boat harbour.

Pillar bay.—To the west is a wide bay, called Pillar bay from a very remarkable columnar mass of sandstone and conglomerate rock which stands near the eastern side, about 25 feet in diameter and 95 feet high. The summit is sloping and covered with some small bushes. It is separated at high water from the main shore, but rises from a sandy and stony flat at low water. The Indian (Haida) name is Hla tad zo wōh.

PARRY PASSAGE separates North island (which forms the north-western extremity of Queen Charlotte islands) from Graham island. The western entrance at the south-east angle of Cloak bay is three-quarters of a mile wide, but is contracted to less than 3 cables by foul ground which extends in a N.N.W. direction from a point on the southern side of the entrance. The passage proper is about 2 miles in length, with an average width of three-quarters of a mile. This channel, between the ledges of rock which extend off the southern side for about one mile and North island, is clear, but the tide rushes through it, forming a race. The flood runs eastward, leaving the east end of the passage with a north-easterly direction. Two deserted Indian villages (Kak oh and Kioo sta) are situated on the south side of Parry passage, near its west entrance.

"Parry passage towards its east end, is separated into two arms by Lucy island, somewhat less than two-thirds of a mile long and one-third of a mile broad. The northern arm is not much over one cable wide; the southern or main channel is more than half a mile wide. The soundings in the main passage are 30 fathoms, with a rocky bottom. The shores, except in the narrow western entrance, seem to be clear of dangers. The northern arm, while extremely narrow, is still farther obstructed by foul ground extending off to the north-eastward from the eastern shore of Lucy island less than half a mile, and a similar bank from the opposite shore of North island. There is, however, a narrow channel having from 4 to 6 fathoms, hard bottom, at the eastern end, and this increases to 15 fathoms in the western part of the arm.

A small islet lies about one mile to the eastward from the eastern entrance to this arm, and a rock awash is reported 2¼ miles N.E. from the same locality, and about 1¼ miles from the southern shore of North island."

Bruin bay.*—Just without the eastern entrance of Parry passage, and on the south side, abreast of Lucy island, is a bay affording anchorage in from 12 to 14 fathoms, sand. A line of kelp fringes the shore which is studded with rocky patches and stones. This is not a good anchorage except for a temporary stopping place during thick weather, as the flood sets into it from the passage, forming a number of eddies, and rendering it difficult to lie at single anchor without fouling it. The country at the back is low and covered with trees, with here and there grassy spots.

NORTH ISLAND, named by Dixon in 1787, is about 5 miles in length, between North point and its southern extreme, and composed of low land, no point probably reaching a height of 300 feet. It is densely wooded. On the eastern side of North island there is said to be a good anchorage in a bay which was formerly often used by the vessels belonging to the old North West Company. A small round high island situated close to point North, a prominent object in approaching, was named Thrumb Cape by Ingraham.

Remarkable wooden carvings are said to exist on the North island shore, or attached to the winter dwellings of the natives. Birds, whales, salmon and other fish and shell fish are reported as very abundant.

Cloak bay forms the western entrance to Parry passage, lying between the south-west shore of North island and cape Knox. It is about 2½ miles wide, and the same deep, the depths in the middle of the bay vary from 30 to 17 fathoms, sand, gravel, and shells, and it is protected from all except westerly winds. Some rocks, on which the sea breaks only in heavy weather, lie some distance from the North island shore, and there are also a couple of remarkable pointed islands on this side.

Henslung.—On the south side of North island, in Parry passage, is a snug cove named Henslung, in which whalers used occasionally to anchor. H.M.S. *Virago* anchored in it in 30 fathoms water, and had but just room to swing clear of the precipitous rocks of conglomerate which form its western side. At the head of the cove is a sandy beach, with a stream of water running through it.

Tides.—It is high water at full and change at Henslung, at 0 h. 20 m., and the rise 16 feet. The night tides are 2 feet higher than the day.†

Lucy island, on the north shore of the passage, is separated from the south side of North island by a narrow channel, on the north shore of

* This place received its name from a large bear coming down on the beach to feed abreast of the ship, while H.M.S. *Virago* was at anchor, in May 1853.

† Mr. William Douglas, commanding the trading ship *Iphigenia* in June 1788.

which is a small Indian village, called Tartanne, which was in former years a place of importance. A reef runs off the east end of Lucy island, and a wide shoal with kelp stretches eastward from the shore of the southern extremity of North island. Between these lies the channel with 8 to 11 fathoms water. Abreast the Indian village the depth in the channel is 6 fathoms.

CAPE KNOX, the north-west extreme of Graham island, is a long narrow tongue of land, on which are a few low hills. The cape may be considered as a gigantic dyke of igneous rock running in an east and west direction. Its south side is bold, and off it lie several rocks in a westerly direction, the farthest out at a distance of about 3½ miles from the cape. On these the swell of the Pacific seldom ceases to break with great violence. A rough trail about a mile in length leads from Kioo sta village (in Parry passage) across the neck of the land at the base of the promontory of cape Knox, to Lepas bay on the west coast.

Cape Knox is situated in latitude 54° 10′ 30″ N., longitude 132° 58′ W.

Directions.—On leaving Bruin bay or Henslung cove for the westward, a vessel may pass close to the cliffs forming the southern side of North island, and keeping at about half a mile outside the reefs that extend off the south shore (Graham island), get a good offing before hauling to the southward, to clear the rocks off cape Knox. When well out, the projecting point of Frederick island will be seen about 18 miles to the south-eastward. At 2 or 3 miles to the southward of Parry passage is an indentation of the shore, which might be taken as its entrance by a vessel coming from the southward,—a mistake that might lead to serious consequences, as the whole coast, as far as Frederick island, appears to contain several open bays, with outlying rocks off each of them. The Indians, in their sketches of this part of the coast, do not draw any harbours, but merely exposed bays.

Frederick island lies about 14 miles S. ¼ W. from cape Knox. Behind this island Ingraham is stated to have discovered a commodious harbour in 1791, which he named port Ingraham. He places this inlet in latitude 53° 47′ N. The northern entrance is formed by two high bluffs with some small islets between them. Here Ingraham obtained 17 fathoms. Northward from the entrance on the coast is a large reef of rocks, and westward and southward from the southern point of entrance along the shore of Frederick island are a large number of sunken rocks. The port extends about 6 miles from the entrance in an easterly direction, is about 2 miles wide with four small islets near the head. In the vicinity of the islets is some kelp. At the head is a beach and 9 or 10 fathoms water. Towards the head the port curves more to the eastward. Half way towards the head Ingraham

got 64 fathoms. The passage eastward of Frederick island has several islets in it and 6 fathoms water. Some kelp is noted in the channel; Ingraham places this south entrance in about longitude 133° 5′ W.

HIPPA ISLAND, lying 26 miles S.E. ¼ S. from Frederick island, appears from a position 1½ miles seaward of Frederick island as high and bold; but from the south its outer end appears as a low point, and the inner end bold. This portion of the coast is higher and more broken than the former, the openings appearing deeper, neither does it seem to have so many rocks lying off it. The Indians show some good harbours towards Hippa. When abreast Hippa island, Buck point, 27 miles distant, and also cape Henry, about 18 miles farther to the southward, can be seen, the coast presenting the same high and broken appearance as the preceding 26 miles. All the points along this part much resemble Buck point.

BUCK POINT, on the northern side of Skidegate channel (which leads through to Skidegate), is rather low and rugged, jutting out from the high land at the back. It has a large high island just to the northward of it, and there is another, much smaller and peaked, standing out clear of the land at about 3 or 4 miles farther to the northward, and lying in the entrance of Cartwright sound, which is formed between Buck point on the south, and Hunter point on the north.

SKIDEGATE CHANNEL, the main entrance to which is about 7 or 8 miles to the eastward of Buck point, and is a little more than one mile in width, extends in an easterly direction for 6 or 7 miles to Log point, where it is one mile wide. This part of the channel affords no sheltered anchorage. At Log point the West narrows commence, which lead to Skidegate inlet. About one mile west of Log point a branch turns off to the southward for one mile, and then westward to the Pacific, which it enters at about 3 miles to the southward of the main channel, forming an island 5½ miles long by 2 broad, which rises to an elevation of 1,000 to 2,000 feet.

This passage is only adapted for canoes or boats, as it is blocked by a bank at its eastern end, with not more than 4 feet on it at high water.

A vessel entering the main channel from the west might find anchorage in the entrance of this passage where it unites with the main channel.

INSKIP CHANNEL,* leading round the north side of Kuper island, is about 8½ miles long, and half a mile wide. A short distance outside it, there are some small islands on both sides, but there will be no difficulty in discovering the passage in. In the channel there was no bottom at 60 fathoms, but at the entrance a cast of 35 fathoms was obtained on a halibut bank. At a short distance inside the islands, on the

* Was first used by H.M.S. *Virago* in 1853.

north side of the entrance, is a village belonging to the Kilkite tribes. Farther in, on the same side, and about 3½ miles up, is a deep opening, and where this and Moore channel meet are two other openings to harbours with some small islands lying near them.

MOORE CHANNEL,* on the south side of Kuper island, is 5 miles long in an E.N.E. and W.S.W. direction, and half a mile wide, the shore on each side being bold of approach, high, and covered with trees nearly down to the water's edge. In mid-channel there is no bottom at 70 fathoms. On the north side, just without the entrance, are some small rocky islets, named Moresby islands, and on the south side, a few rocks close in shore. In 1852 a large number of adventurers from California had collected here to dig and search for gold, some of that metal having been discovered by the Indians.

MITCHELL or GOLD HARBOUR, about 2½ miles deep and half a mile wide, is surrounded by precipitous and densely wooded hills, from 700 to 800 feet in height, and at its head in Thetis cove is a sandy beach and a stream of water. At 1¾ miles up the harbour is Sansum island, a small spot covered with trees, and the ruins of a number of huts. The anchorage lies half a mile further on, in Thetis cove, keeping Sansum island on the port hand, the passage being one cable wide, with deep water, This cove is completely land-locked, but squalls, frequently accompanied by rain, come over the hills with considerable violence.

Thorn rock lies a good half mile from the mouth of the harbour, no the starboard side going in, and has only 3 feet on it at low water; it lies about one cable from the shore; and on the opposite side, at not quite so great a distance from the land, but a little further out, is another rock. These are dangerous to vessels working in or out; but there is nothing to fear if the wind be fair and the ship kept mid-channel.

DOUGLAS HARBOUR.—At one mile to the westward of Mitchell harbour, and on the same side of Moore channel, is the entrance to Douglas harbour, apparently very similar to the former, from which it is separated by Josling peninsula.

Directions.—The land being very high on both sides of the channels leading into the above harbours, influences the direction of the wind which is either right in or out. Winds with any westing blow in, and those with easting the contrary. A sailing vessel leaving Moore channel with a south-east wind should keep well over towards Hewlett bay, to enable her to fetch clear of the Moresby islands, as the wind will be very unsteady until well clear of the high land to windward.

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* *See* Admiralty plans :— Ports in Queen Charlotte islands, No. 2,168.

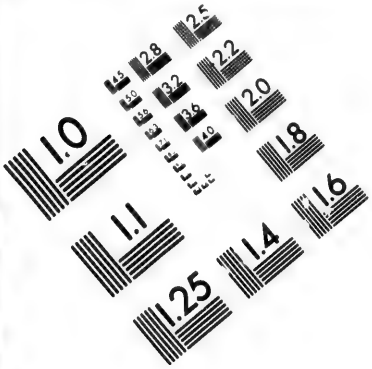
Tides.—It is high water, full and change, at Moore channel, at 1h. 40m.; springs rise 13 feet, neaps 10½ feet.

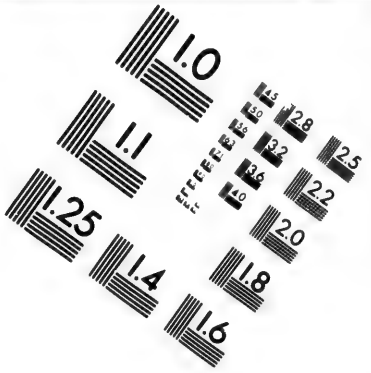
TASOO HARBOUR.—Cape Henry, lying 3 miles from the entrance to Moore channel, terminates in a steep slope with a hummock at the extremity; 17 miles to the southward of this is the entrance to Tasoo harbour, the intermediate coast being high, and rising abruptly from the sea. The entrance is short and narrow, but the harbour itself is extensive, with deep water in many places, the anchorage being near some small islands on the port hand going in; it has only been visited by a few of the Hudson Bay Company's officers.

Between Tasoo harbour and cape St. James are other openings, which, according to Indian report, lead into good harbours, the southernmost of which is that leading into Houston Stewart channel and Rose harbour. Inside Anthony island, and close to Houston Stewart channel, is an opening called by the natives Louscoone, and reported to be a good harbour, not unlike Rose harbour. This coast, excepting off Anthony island, is also apparently bold. The land near cape St. James has fewer trees on it than that to the northward.

The natives (Haida Indians) of the Queen Charlotte islands are fond of travelling, and make voyages of several hundred miles in their canoes, visiting Sitka on the north, port Simpson to the north-east, and Victoria harbour on the south. They excel in the construction of their canoes.

Supplies.—The banks in and near Hecate strait, swept by strong currents, with the shore line of inlets and fiords, constitute the feeding grounds of the halibut and other fish, which abound in the vicinity of the islands. The halibut is the most important, and is largely consumed by the natives; the dog-fish is also very abundant, and is taken for the manufacture of oil; salmon run up most of the streams in large numbers, especially in the autumn; herring are plentiful in some places, especially about Skidegate, at certain seasons; pollock or coal fish are caught on the north and west coast, and supplies an edible oil; flounders and plaice abound in some localities; cod and mackerel are also caught, and probably are abundant on certain banks at some seasons; while smaller fish and shell fish, oysters excepted, form an important item in the native dietary. From April to October the shell fish are said by the natives to be poisonous. Immense flocks of wild geese and duck visit the northern shores of the islands in the autumn. Potatoes grow in abundance in most parts, and thrive exceedingly well, forming an important article of food. These are all to be bought either for money, strong cotton shirts, cotton dresses, plain cotton, knives, tobacco, mother of pearl jacket buttons for ornamenting





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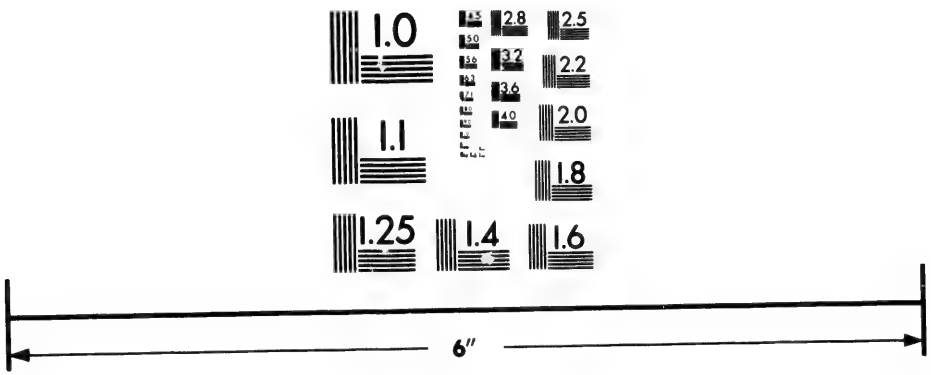

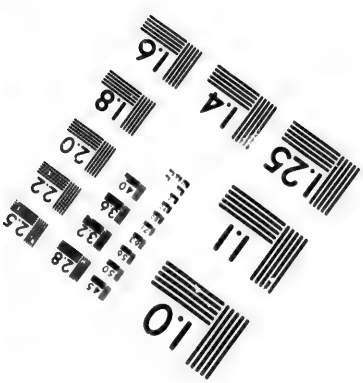

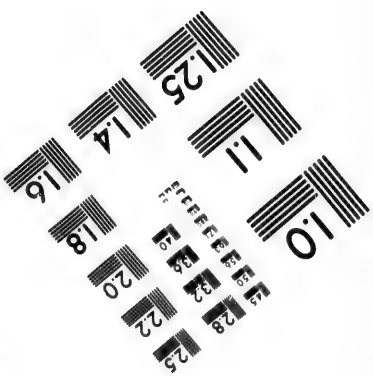

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their blankets, or any of the articles commonly bartered among aborigines. The blanket is now, however, a recognised currency.

Bears are numerous, also martens, sea and land otters, which are caught for their furs, and mostly taken to the Hudson Bay Company's establishment at fort Simpson.

TABLE OF POSITIONS.*

Place.	Particular spot.	Latitude North.	Longitude West.
		° ′ ″	° ′ ″
Esquimalt	Duntze head	48 25 49	123 26 45
Port San Juan	Snuggery cove	48 32 40	124 26 0
Victoria harbour	Laurel point	48 25 22	123 23 02
Semiahmoo bay	Parallel station	49 0 0	122 45 30
Roberts point	„ west side	49 0 0	123 5 26
Fraser river	Garry point	49 07 04	123 11 15
Burrard inlet	English bay	49 16 25	123 11 22
Howe sound, Plumper cove	Observation point	49 24 39	123 29 20
Nanaimo	„ spot	49 10 15	123 56 36
Nootka sound	Friendly cove	49 35 31	126 37 32
Port Augusta	Beak point	49 36 29	124 51 18
Esperanza inlet	Queen's cove	49 52 46	126 59 55
Kyuquot sound	Shingle point	49 59 55	127 9 30
Nasparti inlet	Head of beach	50 11 21	127 37 58
Koprino harbour	Observation island	50 30 0	127 52 16
Quatsino sound	Observatory rock	50 29 25	128 3 39
Beaver harbour	Shell islet	50 42 36	127 25 07
Port Neville	Robbers nob	50 31 08	126 4 22
Klaskino inlet	Twenty feet rock	50 17 40	127 52 40
Port Harvey	Tide pole islet	50 33 47	126 16 48
Farwell harbour	Observatory island	50 35 59	126 41 35
Cullen harbour	Gordon point	50 45 50	126 45 10
Cypress harbour	Tree islet	50 49 45	126 41 00
Tracey harbour	Star rock	50 50 58	126 58 12
Blunden harbour	Burnes Island	50 54 24	127 19 04
Beaver cove	Lewis point	50 32 47	126 52 12
Bull harbour, Hope island	North point of Indian island	50 54 47	127 56 03
Squirrell cove, Carter island	Observation spot	50 07 47	124 56 51
Shushartie bay	Halstead island	50 51 22	127 51 20

* These longitudes have been determined by meridian distances measured from Duntze head, Esquimalt harbour, the longitude of which is assumed to be 123° 26′ 45″ W. of Greenwich.

Place.	Particular spot.	Latitude North.	Longitude West.
		° ′ ″	° ′ ″
Viner sound	Observation spot at head of	50 47 08	126 22 47
Knight inlet	Glendale cove	50 40 07	125 43 40·5
„	Sargeaunt passage	50 41 02	126 11 18
„	Wah shih las bay	51 01 20	125 35 29·5
Seymour inlet	Eclipse narrows	51 04 09	126 47 53
Slingsby channel	Harvell point	51 05 48	127 31 10
„	Treadwell bay (Observation spot on north side of bay)	51 06 03	127 33 30
Takush harbour, Smith sound	Observation point	51 16 51	127 38 43
Fitzhugh sound, Schooner retreat	Centre island	51 28 10	127 44 38
„ Safety cove	Observation spot	51 31 49	127 56 23
„ Welcome Harbour	Kelp point	51 41 5	128 7 45
„ Goldstream harbour	Hawser point	51 43 19	128 0 34
„ Namu harbour	Observation spot	51 51 44	127 52 23
McLaughlin bay, Lama passage	„ spot	52 8 37	128 10 18
Kynumpt harbour	Berry point	52 12 20	128 11 37
Port Blakeney, Milbank sound	Observation spot	52 18 47	128 22 42
Morris bay	Anchorage	52 21 0	128 28 30
Belakula anchorage, Burke channel	Observation spot	52 42 42	126 48 04
Nowish cove	Fell point	52 31 25	128 27 15 (Approx.)
Finlayson channel, Klemtoo anchorage.	Observation spot	52 34 22	128 32 9
„ Carter bay	„ spot	52 49 41	128 24 34
Holmes bay, Whale channel	„ spot	53 16 25	129 5 19
Port Stephens	„ spot	53 20 30	129 41 15
Coghlan anchorage	„ point	53 22 44	129 17 15
Lowe inlet	James point	53 32 30	129 35 48
Port Canaveral	Squall point	53 33 47	130 8 30
Klewnuggit inlet	Morning reef	53 39 24	129 44 51
Alpha bay (Ogden channel)	North point	53 52 01	130 17 34
Refuge bay, Edye passage	Table point	54 3 50	130 32 10
Chatham sound, Qlawdzeet anchorage	Harris island	54 12 59	130 45 40
„ Metlah catlah bay	Observation spot	54 20 10	130 27 30
„ Port Simpson	„ spot	54 33 51	130 26 36
Portland inlet, Nass bay	„ spot	54 59 26	129 57 36
„ „ Nass river	„ spot	55 3 54	129 31 54
„ canal, Bear river	„ spot	55 56 03	130 3 27

Place.	Particular spot.	Latitude North.	Longitude West.
	Queen Charlotte Islands.		
Houston Stewart channel -	Observation spot at Raspberry cove - -	52 9 22	131 4 16
Skidegate inlet - -	Anchor cove, Observation spot	53 12 31	132 14 19
Virago sound - - -	Cape Edensaw - -	54 4 30	132 21 30
Port Kuper - - -	Sansum island - - -	52 56 31	132 9 40

TIDE TABLE.

Place.	High water Full and Change.	Rise.	
		Springs.	Neaps.
	H. M.	Ft.	Ft.
Alert bay, Cormorant island	0 30	15	—
Alpha bay, Ogden channel	noon	18–19	—
Barclay sound, Island harbour	noon	12	—
Beaver cove	—	15	—
Beaver creek, Loughborough inlet	3 0	16	11½
Beaver harbour*	0 30	15¾	11½
Beecher and Pedder bays,† Race island	3 0	8	—
Bellakula	noon	13	—
Blunden and Tracy harbours, Queen Charlotte Sound	noon	16	11½
Bull harbour, Goletas channel‡	0 30	12½	—
Burrard inlet, Strait of Georgia	6 0	16	—
Cameleon harbour, Nodales channel	3 0	16	11½
Carter bay	noon	13	—
Clayoquot sound	noon	12	—
Coghlan anchorage	0 30	18	14
Cowitchin harbour	—	10–12	—
Cullen harbour	noon	16	11½
Cypress harbour, Sharp passage	noon	16	11½
Deep harbour, Fife sound	noon	16	11½
Drayton harbour, Semiahmoo bay	2 0	14	—
Edye passage (Refuge bay)	1 30	17–22	14–17
Esperanza inlet	noon	12	—
Esquimalt§ May to October	Mid to 3 AM	7–10	5–8
Esquimalt§ Nov. to April	noon to 3 PM	7–10	5–8
Fane island, Plumper sound	irr.	12	—

* From observations made in the month of May.

† Note.—The tides are very complicated. In Pedder bay in the month of October the tide at high water was observed to fall one foot, and then to rise again. The ebb stream is diverted into Pedder bay and prevents the water leaving it; but when the ebb stream slackens Pedder bay rapidly empties itself. Beecher bay is subject to the same complication.

‡ From observations made in the month of October.

§ With strong winds from the south-east to south-west the tide rises 2 feet above the ordinary level.

Place.	High Water Full and Change.	Rise.	
		Springs.	Neaps.
	H. M.	Ft.	Ft.
Farewell harbour	1 0	15	8
Finlayson channel, Nowish cove	noon	12	—
Fitzhugh sound, Schooner retreat	0 30	14	11
" " Safety cove	1 0	14	11
" " Goldstream harbour	1 0	15	12
" " Namu harbour	1 0	15	12½
" " Welcome harbour	noon	15–16	12–13
Forward harbour	3 0	16	11½
Fraser river entrance	6 30	7–10	—
" " light-house	4 to 4.30	15–12½	—
Gowland harbour, Discovery passage	5 30	11	—
Griffin bay, Haro archipelago	irr	12	—
Hernando island, (Baker passage)	6 0	12–14	—
Hesquiat harbour	noon	12	—
Holmes bay	1 0	13	10
Inner channels leading from Juan de Fuca Strait to Haro strait	irr.	10–12	—
Jervis inlet	6 0	14	—
Klaskino inlet	noon	12	—
Klaskish inlet	noon	12	—
Klemtoo passage, Finlayson channel	noon	13	8
Klewnuggit inlet, Grenville channel	0 30	17	—
Knox bay	noon	16	12
Kynumpt harbour	0 30	14	11
Kyuquot sound	noon	12	—
Lowe inlet	0 30	17	15
Malaspina inlet	5 0	12	9
Maple bay	—	12	—
McLaughlin bay, Lama passage	1 0	14	8–10
Metlah catlah, Chatham sound	noon	21	17
Nanaimo harbour, Strait of Georgia	5 0	16	—
Nanoose harbour, Vancouver Island	5 0	15	—
Nasparti inlet	noon	12	—
Nass bay	1 5	23–17	—
Neeah bay	0 33	7½	6¾
New Dungeness	3 3	5	—
New Westminster	—	6	—
Nimpkish river	0 30	14	—

Place.	High Water Full and Change.	Rise.	
		Springs.	Neaps.
	H M.	Ft.	Ft.
Nisqually, Puget sound	6 0	18	15
Nootka sound	Noon	12	—
Nuchalitz inlet	Noon	12	—
Observatory inlet	1 5	23	12
Olympia	5 8	9¼	—
Ou ou kinsh inlet	noon	12	—
Pender harbour, Strait of Georgia*	6 0	12–14	—
Plumper cove, Howe sound*	noon	12	—
Port Augusta	5 0	12	—
„ Blakeney, Milbank sound	noon	13	8
„ Canaveral	0 30	18	—
„ Discovery	2 30	7	—
„ Essington	1 0	24	—
„ Graves*	noon	12	—
„ Harvey, Call creek†	0 30	10	—
„ John, Fisher channel	1 0	13	—
„ Kuper	1 40	13	10½
„ Neville†	0 30	17	—
„ Simpson	1 30	17–22	14–17
„ Stephens	0 30	18	—
„ Townshend	3 49	5½	5
Portland inlet	1 30	23–27	15–20
Prideaux haven	5 0	12	—
Qlawdzeet anchorage	1 30	17–22	14–17
Quatsino sound, Vancouver island	11 0	11	—
Rendezvous islands	7 0	14	—
Roche harbour, Haro strait	irr.	12	—
Sargeaunt passage, Knight inlet	1 0	15½	12
Seymour narrows	3 0	13	—
Shoal harbour	1 0	15	10
Shushartie bay*	—	12	—
Skidegate inlet	1 0	17	14
Slingsby channel	2 20	11	5
Sooke inlet	2 0	8	—

* From observations made in the month of October.
† From observations made in the month of May.

Place.	High Water Full and Change.	Rise.	
		Springs.	Neaps.
	H. M.	Ft.	Ft.
Squirrel cove	5 0	12	—
Stamp harbour	noon	12	—
Steilacoom	4 46	11	9¼
Stuart anchorage	0 30	17	—
„ channel, Oyster harbour	6 0	10	—
„ island	6 0	12–14	—
Sunday harbour and Dusky cove, Queen Charlotte sound	1 0	13	—
Suquash anchorage	0 30	16	—
Surge narrows	6 0	12	—
Sutil channel	6 0	12	—
Takush harbour, Smith's inlet	1 0	14	11
Telegraph and Oyster harbours	6 0	10	
Topaze harbour	3 0	16	11½
Treadwell bay	0 30	11	5
Tucker bay	7 30	16	—
Uchucklesit	—	12	—
Viner sound	1 0	15	10
Victoria harbour* — May to Oct.	Mid. to 3 a.m.	7–10	5–8
Victoria harbour* — Nov. to Apr.	Noon to 3 p.m.		
Waddington harbour, Bute inlet	6 0	12	—

* With strong winds from the south-east to south-west the tide rises 2 feet above the ordinary level.

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